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ABSTRACT

Presented is the final report of a project designed to develop systematic curricula, instructional materials, and procedures for the integration of moderately handicapped children, such as the educable mentally retarded, learning disabled, and behaviorally disturbed, into the regular classroom milieu; and to develop instructional materials and procedures for teaching severely handicapped children. Nine chapters in Part I cover National Institute of Education research implications; a hierarchy of systematic instructional procedures; research related to reading, writing skills, and arithmetic; data decisions and evaluation; classroom organization and management; strategies for managing naughty behaviors; and a review of the project findings. Part II covers the research on and application of a prototypic model designed to provide the educator with a set of procedures to follow in developing instructional sequences and materials for skills learning. Reported in Part III is the dissemination of the products and materials developed by the project by each of the three teams involved. Tables and figures are listed and indexed. (IM)

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Final Report
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A PROGRAM PROJECT FOR THE INVESTIGATION AND
APPLICATION OF PROCEDURES OF ANALYSIS AND MODIFICATION
OF BEHAVIOR OF HANDICAPPED CHILDREN

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TABLE OF CONTENTS

	<u>Page</u>
List of Tables by Chapter	ii
List of Figures by Chapter	iv
Abstract	vii
Preface	viii

Part I

Chapter 1 NIE Research Implications: An Overview . . .	1
Chapter 2 Systematic Instructional Procedures: An Instructional Hierarchy	22
Chapter 3 Reading	41
Chapter 4 Writing Skills	97
Chapter 5 Arithmetic	131
Chapter 6 Data Decisions and Evaluation	174
Chapter 7 Classroom Organization and Management	198
Chapter 8 Strategies for Managing Naughty Behaviors	226
Chapter 9 Conclusion	252

Part II

Research and Application of a Prototypic Model for Developing Instructional Materials for Handicapped Children	1
--	---

Part III

Dissemination of Products and Materials	
Section A: Team I	1
Section B: Team II	46
Section C: Team III	112

LIST OF TABLES BY CHAPTER

	<u>Page</u>
Part I	
Chapter 3	
Table 1: Median Correct and Error Performance Per Minute on Reading Tasks of ASBAK Assessment Inventory for Vance and Two Classmates	76
Table 2: Pre-reading and Beginning Reading Skills	77
Table 3: Suggested Teaching Procedures Based on Pupil Performance	78
Table 4: Mean Median Correct & Errors and Mean % Correct	79
Table 5: Early Comprehension Skills: "What" Questions	80
Table 6: Word Attack Strategies	81
Table 7: X Errors/Day	82
Table 8: Mean Medians, % Word Accuracy Scores, and % Change	83
Chapter 4	
Table 1: Average Days to Criterion and % Retention During Teacher-correction vs. Self-correction of Spelling Lists	123
Table 2: Spelling - Students' First Choice of Tactics and Their Effectiveness	124
Chapter 5	
Table 1: Pupils Mean Baseline Performance in Each Class of Story Problems	162

Part II

	<u>Page</u>
Table 1: Results of Secondary Fieldtesting - Shoe Tie Program	51
Table 2: Number of Instructional Days per Student per Criterion Test	52
Table 3: Results of Final Fieldtesting - Shoe Tie Program	53
Table 4: Final Fieldtest - Shoe Tie Program - Number of Instructional Days per Student per Criterion Test	54
Table 5: Dissemination of Team III Research 1974-1975	20
Table 6: Results of Secondary Fieldtesting - Let's Tell Time Program	55
Table 7: Results of Secondary Fieldtesting - Ruler Measurement Program	56

LIST OF FIGURES BY CHAPTER

	<u>Page</u>
Part I	
CHAPTER 2	
Figure 1: Learning Hierarchy	36
CHAPTER 3	
Figure 1: Placement Data	84
Figure 2: Correct and Error Rates for Letters and Words Written Throughout the Two Conditions of Experiment 1	85
Figure 3: Correct and Error Rates for Oral Reading Throughout the Two Conditions of Experiment 1	86
Figure 4: Words Read Orally Per Minute	87
Figure 5: Pre-Post Placement Data	88
Figure 6: Daily Data on Reading Comprehension	89
Figure 7: Corrective Cue Data Sheet	90
Figure 8: Reading Skip	91
Figure 9: Placement Data	92
CHAPTER 4	
Figure 1: Cursive Probe 1	125
Figure 2: Cursive Probe 2	126
Figure 3: Percent Correctly Spelled Words	127
CHAPTER 5	
Figure 1: Sample Arithmetic Sheet	164
Figure 2: Example Raw Data Sheet	165

	<u>Page</u>
Figure 3: Data Which Indicate Modeling Was a Successful Technique During the Initial Acquisition Stage	166
Figure 4: Data Which Indicate a Verbal Mediator Influenced Performance During the Initial Acquisition Stage	167
Figure 5: Data Which Show That a Meal-planning Contingency Was Effective During the Advanced Acquisition Stage	168
Figure 6: Data Which Demonstrate the Retention Type of Generalization	169
Figure 7: Data Which Indicate that Within-class Generalization Had Occurred	170
Figure 8: Data Which Indicate that Across-class Generalization Had Occurred	171
Figure 9: Data Throughout the Several Conditions of the Story Problem Study	172

CHAPTER 6

Figure 1: Data Decisions Flow Sheet	190
Figure 2: Data Evaluation After Three Days of Data	191
Figure 3: Intersection of the Middle Day and the Middle Rate	192
Figure 4: Setting Dynamic Aim - Method 1	193
Figure 5: Setting Dynamic Aim - Method 2	194
Figure 6: Data Showing the Need for Change	195
Figure 7: Illustration of Phase Change Line	196

CHAPTER 7

Figure 1: Data Showing Effect of Self-marking Contingency	218
Figure 2: Data Showing Effect of Cognitive Modeling Contingency	219

	<u>Page</u>
Figure 3: Sample Data Summary and Recording Sheet	220
Figure 4: Graph of Summarized Data	221
Figure 5: Sample Daily Schedule	222

Part II

Figure 1: Prototypic Model for Instructional Material Development	57
Figure 2: Procedural Lattice for Lattice Development	58
Figure 3: Lattice: Prerequisite Knowledge	59
Figure 4: Lattice: Task Analysis	60
Figure 5: Lattice: Cell Components	61
Figure 6: Lattice: Graphic Representation	62
Figure 7: Lattice: Ridgeline	63
Figure 8: Lattice: Subgoal and Four En Route Objectives	64
Figure 9: Lattice: Sequence of Three En Route Objectives	65
Figure 10: Lattice: Combination of Smaller Lattices	66
Figure 11: Lattice: Lattice Developed	67
Figure 12: Lattice: Shoes Tied	68
Figure 13: Sample Lesson	69
Figure 14: Lattice: Uses Ruler	70
Figure 15: Lattice: Timetelling	71

ABSTRACT

Program Project was a multi-faceted, interrelated research project directed at two basic problems: (1) educating every child, including the severely handicapped, and (2) more effectively integrating moderately handicapped children into regular school programs. One of Program Project's goals -- to develop systematic curricula instructional materials, and procedures -- will enable the regular classroom teacher to successfully integrate moderately handicapped children, such as the educable mentally retarded, learning disabled, and behaviorally disturbed, into the regular classroom milieu. A second goal was to develop instructional materials and procedures for teaching severely handicapped children. Program Project was divided into three research teams. Each team had a specific major emphasis, but all of the teams' research projects, and the products generated by their activities, were closely related to the goal of providing the most effective educational experience possible for every child.

PREFACE

Many people have contributed to the success of the work discussed in this report. During the project's five years, classroom and support services personnel, parents, and the pupils themselves have all helped in their different ways to make the work interesting. Moreover, we believe that the project has yielded results that will make it possible to educate every child and to integrate moderately handicapped children into regular school programs more effectively.

Once the research was completed, however, there remained the important task of reporting the findings, and preparing the narrative that you are about to read. A writing project of this scope and size does not just "happen," of course. Here, too, there was significant assistance from others, and we would like to thank those who gave it. Kathy Walker did the major part of the copy editing and proofreading for the whole volume. In addition, Ms. Walker, Connie Pious, and John Bush contributed some of the ideas, organization, and writing of Chapter One and Chapter Nine.

PART I

CHAPTER 1

NIE RESEARCH IMPLICATIONS: AN OVERVIEW

Introduction

One of today's major educational and social crises is the high incidence of illiteracy that exists among high school students, young adults, and other citizens of our society. Approximately 18 million adult Americans are functionally illiterate according to a recent Harris Survey. This finding has been a matter of concern not only to educators, but also to the Secretary of HEW, and led to the establishment of the Right to Read Program. This program has issued a request for proposals to establish a number of academic centers throughout the United States to continue investigating procedures for teaching reading, and to establish service programs designed to provide remediation for those who have been in school programs but who are still unable to read.

Our educational program deficits do not begin and end with the problems we've had teaching reading, however. While this is obviously the most important deficit we have observed, there are also large numbers of children and adults who may be able to read but who cannot express their thoughts effectively either orally or in writing, cannot spell, and have severe deficits in sentence construction. Still others seem unable to use numbers in measurement, computation, and recording. All of these individuals have had the opportunity to attend public school; many of them have been in schools for 12-13 years and have still not acquired or developed the ability to apply these academic skills.

We are talking about a serious problem that does not appear to be soluble merely by pouring more and more dollars into our public school systems. Huge outlays of money have been distributed to schools throughout the United States, and they have not assured effective programs. It would be one thing, of course, if we were teaching another curriculum -- the Greek language or antique car mechanics. But, in fact, our schools are teaching reading, writing, spelling, math, and measurement. And the fact remains: we are having difficulty teaching all students to apply and utilize these skills. At least one reasonable conclusion to draw is that we need to examine the procedures, methods, and materials we are using in teaching these skills, and the effectiveness of our teacher preparation programs.

We certainly do not lack the schools in which to teach skills to everyone. We established those through legislation in the 1800s. More recently, in the last 25 years, we have looked at some of the variables of instruction in an effort to improve it. We have looked at class size and we have reduced it to the point where most school districts operate with a classroom ratio that is not less than 24 and not greater than 35 students per classroom. In many of these classrooms, teachers have teaching assistants. We have also found that some teaching procedures and methods are more effective than others. But by and large, most of

the research examining class size and teaching strategies has failed to yield conclusive results. This has led educators to be confused and uncertain about which strategies to pursue in order to make education a more effective endeavor. They have been unable to identify the problem(s) that have contributed to the extent of academic failure among children and youth in this country. (Hamblin, Buckholtz, Ferritor, Kozloff, & Blackwell, 1971) Clearly, these issues are not altogether uncharted territory. But many attempts to isolate factors contributing to the problems or to identify whole classes of problems are susceptible to spurious conclusions because of methodological or other problems. Our field has also been plagued by wide philosophical swings and fragmentation: groups advocating this theory or that practice are almost too numerous to document.

To reiterate, then, somewhere our educational system has gone awry. When our citizens spend as many as 12-13 years in classes, and when so many of them emerge lacking the very skills they were there to learn, that is devastating news for educators.

Obviously, some problems seen in the educational context have their roots outside that setting, and in conditions which educators can rarely influence. For instance, it may be unfair to "blame" a school teacher for his/her pupils' failure to learn to read when these pupils come to school hungry. Yet it may also be begging the question to look for causes of failure outside the educational setting when we realize that over the years many people have sustained incredible hardships -- poverty and all of its corollary conditions such as poor housing, poor nutrition, illness, and economic pressures that would militate against continuing education -- and have nevertheless acquired a full range of functional skills. Moreover, as a look at Otto Bettman's recent book (The Good Old Days -- They Were Terrible!, 1974) can tell us, many children managed to acquire these skills in the "old days" even in an educational environment that was as aversive to learning as anything imaginable. In any event, causes for failure found outside the present educational setting do not relieve educators of the obligation to look within that setting for the means to improve instruction so that it is indeed successful for everyone.

What Are the Issues?

Perhaps one way to begin looking within the setting for reasons for educational failure can be found in a story that is told about the noted American writer, Gertrude Stein. Once, when Miss Stein was in a foggy state coming out of anesthesia after an operation, she said rather wistfully, "What is the answer?" And then, after a pause in which there was no response, she said, "In that case, what is the question?"

As we said earlier, neither research nor speculations have given us definitive answers to questions about educational failure. Perhaps it is appropriate, then, to re-think the questions we ask in order to return to some basic issues. For no matter how often, how much, or how carefully we review research findings, we are still confronted with certain key issues in any teaching/training situation.

The most fundamental question: What is the purpose of education?

At the outset, we should state our view that schools in a democratic society exist to provide a kind of apprenticeship for adult participation in that society; an opportunity for supervised learning and practice of basic skills that will be required. This is the case for the pupil who leaves school at 16 to become a garage mechanic as well as for the student who plans to receive an advanced degree in physics. Both pupils will find the going very rough without fundamental skills.

It would be foolhardy in the extreme to think of education within schools as "final" learning, particularly in a society that is undergoing such rapid change as ours. Rather, it is precisely because of the speed of change that one wishes to equip one's students with those skills that can enable them to respond to change intelligently. For this reason, we believe that particular instructional topics are less important than inculcating basic, generalizable, and applicable skills. For instance, when one realizes that children in junior high school now are studying subjects that were once included in college curricula, it is easy to see that "advanced" subjects can retreat very quickly. So, too, with particular materials: when pocket calculators are available in such exotic electronics outlets as Sears-Roebuck, it may be counterproductive to insist that children learn to compute with pencil and paper.

What one hopes, finally, is to teach pupils how to learn effectively and efficiently and to apply the information and skills that they learn. In a democracy, the "educated" product of our schools ought to be a person who can read, write, use mathematical skills, organize and express ideas, make intelligent decisions, solve problems rationally, and retain a spirit of inquiry. This is the case because we expect our citizens to function independently, to participate in the decision making process of a democracy, to process information effectively; and because we would like them to lead satisfying lives. Ideally, our curricula and our instructional procedures should send them on their way.

The next question, obviously, is: How do we teach these skills?

We are interested in knowing how to find the most effective means of teaching skills so that pupils not only acquire them but retain, process, and use them. This question is almost as large as the educational universe and has stimulated the research reported in this volume. We have identified a series of component educational problems related to this issue that we believe are critical fields for study. Some of the issues that have engaged us during the course of these studies can best be stated as questions, for we believe that by asking provocative questions we may begin to find useful answers.

Research question #1: How do we arrange, order, and sequence tasks so that they lead most directly and efficiently to the desired skills?

Any teacher who has ever approached one of the more global instructional tasks such as "teaching reading" knows very well that one does not teach reading all at once. The prerequisite skills for reading are so many and so varied that each one can be considered global in itself. The issue then becomes one of arranging the prerequisite learning experiences so that children can move through these steps smoothly and with pleasure. Moreover, the teacher knows that pupils do not simply "learn to read." After they begin to acquire reading skills, they need to become proficient in using them and they need to retain these skills and use them in different, often unpredictable situations. So here, too, the teacher needs to think about and achieve an optimal arrangement of learning experiences to accommodate each child's progress in the total learning process. "Teaching reading" is only an extreme example of an instructional task requiring attention to order and sequence. In one sense, instruction in any skill requires that kind of precision; only the increments and steps may be of a different kind and order of magnitude.

Research question #2: Given children's individual learning idiosyncrasies, what are efficient strategies for tailoring instructional programs to accommodate these differences?

The range of skills and learning styles that children bring to an average public school class may be immense. Forget for a moment such constructs as "innate ability" or intelligence. The fact is, any peer group of 30 children -- the size of most public school classes -- will represent a formidably diverse collection of skills and styles.

How can a teacher accommodate individual differences and still be certain that all children are making acceptable gains in learning? How is learning best accomplished in small groups? In large groups? How does the teacher select instructional strategies -- that is, how does he or she know when, for what tasks, and under what circumstances to divide the 30 children into sub-groups? For instance, certain drill and practice procedures work quite well in group instruction and streamline the teacher's efforts. There is a certain economy in working with a group on auditory discrimination exercises, for example. But if the task for the moment is to help each child achieve proficiency in instructional tasks that do not lend themselves to group instruction, the teacher must still find economical means of individualizing drill and practice. How can these distinctions and decisions be made more efficiently? What refinements are necessary to permit individualized instruction despite the relatively large number of individuals in the classroom?

Research question #3: How best to measure students' progress?

Underlying this question is an even larger one: What information does a teacher require in order to meet all children's instructional needs and to make instruction more efficient? There are many kinds of information: For instance, the teacher needs ongoing information in order to respond immediately to changes in progress, whether good or bad. But he/she also needs information that indicates whether skills are retained -- in other words, periodic measures. If we agree that efficient instruction means teaching all the children in the class of 30, information about group progress or lack of progress is as vital as information about individual performance.

The problem, of course, is that if teachers did nothing but measure student performance, they would have little time for instructing. How can measurement be made efficient? What kinds of information can most efficiently lead to improved instruction and learning?

Research question #4: How can we help children to spend their time in school most efficiently?

"Behavior problems" are so often barriers to learning that they cannot be omitted from any consideration of ways to improve instruction. And teachers so often complain about children who do not pay attention, who are disruptive, who are "unmotivated," that it is easy to imagine a teacher's efforts focused exclusively on behavior problems and deflected from instruction entirely. Nevertheless, these problems must be resolved within the classroom.

How, then, can one arrange the environment -- the very social environment of a classroom -- to produce optimal learning conditions for every child? How to induce motivation in a "tuned-out" child? How to arrange consequences that promote positive behavior change? How to stimulate each child so that learning itself becomes his or her most effective reinforcer?

Program Project Research: Methodology

The research group headed by Haring and Lovitt at the Experimental Education Unit, University of Washington, funded first by the Bureau of Education for the Handicapped and later by the National Institute of Education, has been investigating aspects of the instructional questions mentioned above for the last decade. The results of the numerous investigations included in this volume have been found to be reliable. Many of the investigations have been replicated as many as ten times, yielding the same results. Only those studies which have held up through a series of replications are reported in this volume.

Research Methodology: Applied Behavior Analysis

Researchers in the social sciences have long been enamored with group research and normative data, and as Dr. Lovitt so aptly states: ". . . the groups are then analyzed and the winner announced" (Lovitt, 1976). The unfortunate aspect of this race for consensual validation, however, is that the individual pupil who is to benefit from this research is often left at the starting gate with no concrete answers to his/her specific learning problems.

By contrast, the research methodology used by the Program Project research teams in developing curriculum and investigating instructional procedures has been a series of behavioral procedures which, grouped together, are generically called the techniques of Applied Behavioral Analysis. Of recent origin, these procedures nevertheless are the culmination of a series of studies beginning with the work of B. F. Skinner who, some thirty years ago, defined the principles of operant conditioning. Applied Behavior Analysis can be characterized as a system comprising five basic ingredients: replicable teaching procedures, individual analysis, experimental control, direct measurement, and daily measurement (Lovitt, 1976).

Replicable teaching procedures. Procedures used in the experimental setting should be so fully described in the research that they can be accurately replicated in other experimental settings. For instance: If procedures to teach reading were being investigated, in Applied Behavior Analysis the person reading the research would be informed of not only the amount of time devoted to instruction, but the words being taught, as well as the methods used to teach them.

Individual analysis. Single subject methodology is of central importance to the Applied Behavior Analysis technology. Data may be obtained on five subjects, but a graph of each subject's performance is shown. This method of displaying data not only makes apparent any idiosyncratic behavior patterns but also indicates rather dramatically if and when an instructional intervention is needed in order to improve the subject's rate of learning.

Perhaps this emphasis on individual data most distinguishes Applied Behavior Analysis from other research systems, which so often report group data. These systems often offer a mean score to explain the performance of a group -- and in doing so often report a score representative of no one group member. Or worse, a mean score which reflects moderate improvement might comprise individual data which demonstrate that a given intervention had an enormous effect on a few and little or no effect on the majority of pupils being taught.

Experimental control. As in any research methodology, Applied Behavior Analysis seeks to establish a functional relationship between independent and dependent variables. But where many research methodologies use experimental and control group comparisons and analyze pre- and posttest data, Applied Behavior Analysis most frequently uses an A-B-A research design with each pupil in a given experiment. That is, during phase A, baseline or pre-test data are taken over a period of time. During phase B, the instructional intervention or experimental variable

is implemented. During a third phase, the conditions of phase A are repeated and data are again taken and compared with the data taken from the pretest condition. If there is a change in behavior in the pre- and posttest conditions, then it is reasonable to assume that there is a functional relationship between the pupil's learning and the instructional intervention which occurred during phase B.

This type of experimental methodology has two readily apparent benefits over group comparison studies. The data generated from an A-B-A designed experiment are directly relevant to an individual pupil's learning. They do not represent a fictional "normal" pupil's score. More important, however, is the fact that the research conducted by the project's Teams I and II using an A-B-A design involved all pupils in the experimental situation. There were no pupils losing learning time as control subjects, those who -- in the name of science -- purposely do not receive the potential benefits of a particular instructional innovation. The two other basic ingredients of Applied Behavior Analysis -- direct measurement and daily measurement -- will be discussed next within the larger context of assessment.

Research Methodology: Assessment As Part Of The Learning Process

Much of the information that we have gained about the classroom organization, the arrangement of appropriate curricular activities, strategies for presenting cues, the stages of learning, and the relevance of these stages to instructional decisions and tactics has come from the use of direct daily measurement of the child's performance by precise academic pinpoints. Important in our analysis of all performance data, of course, has been the use of conventional charting to display this information and the analysis of both correct and error responses that children make. It is from these analyses that we make decisions that affect our teaching strategies, and ultimately the rate at which the pupils learn.

Direct measurement. Simply stated: when Applied Behavior Analysis techniques are used, the behavior taught is the one that is measured. If the researcher is concerned with the child's ability to orally read words from a primer, then the researcher or teacher listens to the child read and assesses that behavior. Direct measurement procedures stand in contrast to indirect tests that use normative test scores as criteria and do not necessarily measure behaviors of immediate concern (tests of intelligence are a prime example).

Daily measurement. Measurement on a frequent, preferably daily, basis is an important ingredient of Applied Behavior Analysis. If, for example, the target behavior is reading a given number of words of a given syllabic length, the pupil is afforded an opportunity to perform that skill over a number of days. During this time, daily measurements or baselines are taken before a judgment is made concerning the pupil's ability to perform. Thus, the possibility of obtaining erroneous data on a child because of erratic performance on an "off" day is eliminated. The same, of course, is true of the frequency of data collection after

the experimental variable has been introduced into the learning situation. Components of the measurement are:

1. Pinpointing. It may seem too obvious to mention that the first step in assessment is precise pinpointing of the target behavior to be taught or extinguished. But upon closer scrutiny it becomes apparent that identifying these behaviors is not always so easy! For instance, if a teacher complains that the problem with a misbehaving child is that he "simply won't sit still," we might at first want to create a program oriented toward getting the child to exhibit more "sitting still" behavior. Sitting still, however, is not really what the teacher wants the child to do at all. In reality the teacher wants the child to stop throwing paper, jumping up, talking out of turn, and to start writing, or raising his hand, or cutting paper. In making a precise assessment, we refer to the specific behaviors which we truly want to teach or modify.

2. Movement cycles. The specific targets of instruction and management must meet three basic criteria: (1) they must involve movement so we may be assured that the target involves behavior, as opposed to the absence of behavior (like "sitting still"), (2) they must be repeatable so we are assured of adequate opportunity to work with and change the movement, and (3) they must have a definite cycle (beginning and end) so that each instance of the behavior is fully defined by its initiation and termination -- facilitating reliable assessment and the contingent arrangement of instructional or managerial events. Any behavior which meets these criteria is called, simply, a movement cycle.

3. Charting. Once data have been collected on the frequency of a movement cycle, it is necessary to present them so that they are easily interpretable. This is best accomplished by using charts. If organized properly, charts can indicate clearly the rate at which a child is learning, and whether or not we need to modify our teaching strategies. However, charts can often be misleading; they can sometimes expand or contract data so that they are even less meaningful in charted than in tabular form.

The "6-cycle" chart* has been designed to eliminate many of these problems of interpretation. Among this chart's more salient advantages is that it uses a ratio scale to show response frequency. The rate at which a child learns and changes over time is precisely and accurately presented on this chart. That is, changes in performance are displayed proportionally so that the relative rate of learning is more apparent than the absolute amount of learning. For example, if a child increases his rate of reading a series of words from 10-per-minute one week to 20-per-minute the next, his rate of change (times-two, or doubling) is as great as that of the child who goes from 40 to 80 words in the same amount of time.

*The "6-cycle" chart was originally developed and designed by the Behavior Research Co., P. O. Box 3351, Kansas City, Kansas 66103.

4. Trend analysis. The purpose of keeping data and charting them in the manner we described is to help the teacher make accurate decisions about the efficacy of a certain teaching tactic -- when to continue with a certain procedure or when to change it. This kind of decision is based on analysis of progress trends. In order for the teacher to be consistent in his/her decision making, it helps to formulate certain decision "rules" or criteria which could govern procedures for placing a child in the curriculum, evaluating the child's progress toward instructional objectives, and advancing the pupil to new steps in a task. Usually these decision-making rules have two basic components: (1) the rate of progress pupils must make over a certain period of time; and (2) the amount of time a pupil can fall below this program aim before the teacher will intervene (Haring & Gentry, 1976). These decision-making rules and the reasons for formulating them will be examined at greater length in following chapters in this volume. But what is abundantly clear is that the decisions must be based on pupil performance data, particularly analysis of progress trends.

In summary, then, the reasons for assessing children's performance are related to the general goals of instruction. "The general goal of providing an effective instructional process can be stated through enabling objectives: (1) To assess each child for placement in reading, arithmetic, spelling, and handwriting by the third week of the school year; (2) to establish long-range objectives for each child, i.e., where the child will be at the end of the school year in each specified subject area; (3) to establish immediate objectives which are a first step toward long-range objectives; (4) to write a systematic instructional plan for each child in each specified subject area describing instructional materials, instructional procedures, reinforcement conditions, and evaluation procedures; (5) to obtain performance data on each child in each area at least three times per week; and (6) to use the obtained performance data to determine when to advance to new learning objectives or to provide alternate instructional procedures." (Haring & Gentry, 1976)

Program Project Research:
Major Areas of Investigation and Discovery

Throughout our years of research into patterns of learning and instructional strategies, we have organized the investigator's activities into six major themes or categories:

1. examining learning as it occurs in a hierarchy;
2. demonstrating the importance of direct daily assessment to decision making and instructional tactics;
3. investigating various teaching strategies relevant to stages of learning and areas of curriculum;

4. developing effective methods for classroom behavior management and for teaching appropriate social behavior;
5. validating our findings through systematic evaluation of student performance;
6. developing strategies for organizing classrooms in order to individualize instruction and implement the results of the above investigations.

Each of these six directions that our research has followed has come to have significant bearing on instruction. Primarily our research has dealt with the instructional cues which the teacher arranges before the child makes responses -- the antecedent events. We have come to see that a precise and systematic approach to arranging the antecedents of instruction -- the organization of the specific cues -- and drill and practice opportunities have a great effect on academic learning.

Examining the learning hierarchy. One of the first findings to arise from our precise behavioral analysis approach is what we call a learning hierarchy. Our studies of learning patterns and our examination of direct, daily records of responding have led us to believe that there exists a hierarchy which includes different learning phases, each requiring different instructional procedures to insure maximum growth and learning.

We have found that many different kinds of activity occur between the time when a learner makes his/her first tentative stabs at performing a skill, or his/her first acquaintance with new facts or other information, and the time when the learner can retrieve all of the skill components and information in order to make appropriate responses to the changing environment. The different kinds of activity reflect the different learning and instructional phases. Tentatively -- in the course of our research -- we have identified five of these phases: acquisition, fluency-building or proficiency, maintenance, generalization, and application or adaptation. We cannot say that these phases are always discrete entities, nor are the landmarks that identify phases or phase changes always clear. Ideally, the transitions from one phase of learning to another should be barely discernible to a naive observer: Only through a precisely displayed continuous record of learning can these stages of learning be detected. We further acknowledge that future research on the learning phases may identify many more of them or it may prove two or more phases to be simple extensions of one another. The learning phases and the investigations from which they were identified will be discussed in much more specific detail in later chapters. For now, we will limit our discussion to the following brief outline.

The unique contributions of our research are due primarily to our system of measurement, for when performances are assessed and analyzed daily, over a long period of time, certain learning patterns emerge which are overlooked by alternative assessment strategies. For example, during a pupil's acquisition of vocabulary words, his or her rate of correct word pronunciation usually accelerates twice as fast after the

first few trials of drill; and the errors are usually reduced to nearly zero in three or four trials. The rate greatly increases until the child becomes fluent on that particular sight word list. After the child reaches a certain rate of correct responses on sight word vocabulary, the rate remains fairly stable. When a new sight word list is presented the process is repeated -- a low rate of correct and a high rate of errors occur until fluency building occurs. This pattern can continue until a specified criterion level is reached. If we do not allow enough opportunity for drill to reduce the errors to almost zero and for the child to achieve fluency, his or her retention of the word list will be very poor. On the other hand, if the child reaches fluency (e.g., 60-80 words per minute in reading sight words), maintenance or retention of the word list will be significantly improved.

Generalization has also been observed. For example, daily word lists are taught to the point where the child is fluent (i.e., he/she is able to sight-read the words at a high correct rate). His/her ability to read out of a book where these words and new words appear is increased -- evidence of generalization of learning.

The teaching procedures we use need to "match" those steps. During acquisition, for example, such teaching tactics as modeling responses for the child to imitate, or hand-shaping responses, help the child to make the initial desired response. After the child can make the desired response with some reliability, say six correct responses out of ten trials, it can be said that the child has acquired the response. But acquisition, of course, is not complete learning; we advance to the next stage, fluency-building.

Fluency building, a stage of learning during which a defined level of proficiency is reached, is accomplished by planned drill and practice. But even when proficiency is reached, which means that the child is responding correctly at a very acceptable rate, his or her rate of responding will not be maintained without periodic practice. There is finally a certain time when natural retention becomes possible: the level of performance as it has been observed remains stable even after several days of no opportunity to practice. It can be said at that point that the skill has been built into the child's natural repertoire. The skill is maintained.

The next step in the hierarchy is to develop the ability to employ the skill in a variety of different stimulus situations. Mixed practices and opportunities to use the skill are required to promote generalization; and are necessary if the skill is to become useful outside of the specific instructional setting.

Finally, the child must learn to apply the skill in situations which not only require a response to a new stimulus, but actually demand that the mode of response be modified in some way as well. Very carefully structured practice situations must be set up in which the particular response requirements are defined in terms of what they should accomplish -- and not merely define the particular mode of response per se. Only when flexible application of a skill has been demonstrated can we finally say that the skill has been completely "learned."

Demonstrating the Importance of direct daily assessment to decision making and instructional tactics. Direct daily measurement of the child's performance or precise academic pinpoints -- all of which we have discussed above -- have provided us with much of the information that we have gained about classroom organization, the arrangement of appropriate curricular activities, strategies for presenting cues, the stages of learning, and the relevance of those stages to instructional decisions and tactics. Equally important in our analysis of performance data, of course, has been the use of conventional charting to display this information. As noted above, it has also been of tremendous importance to our research to analyze the correct responses and error responses of children separately.

Previous research has yielded mixed or confusing results about instructional procedures because primitive and inaccurate ways were used to measure children's performance. Most studies use group achievement tests for assessment of children's progress. But as we said earlier, we have come to see that group inferential achievement measures, given before and after instructional intervention has occurred, do not give enough information about the nature of the performance change or of the learning which has taken place. In addition, group measures do not give information about specific error patterns or response frequencies. Continuous performance records are crucial to instruction and must be updated by the teacher after each instructional session. This type of progress assessment, administered and analyzed for each child individually, provides crucial information about the unique way in which the child learns. This information guides the teacher in making specific instructional decisions that are suited to an individual child's learning characteristics. Refinements in assessment procedures that involve specifying precise pinpoints, carrying out specific individual assessment, setting instructional aims using direct daily measurement to assess the child's progress, and displaying that information accurately, serve as the basis for analyzing the child's performance and developing the teaching strategies appropriate for each child.

Investigating various teaching strategies relevant to stages of learning and areas of curriculum. The project staff have been involved in investigations of teaching strategies as they relate to several areas of instruction (math, reading, writing, creative writing, and spelling). They have investigated typical general teaching techniques currently used by regular and special classroom teachers. Many of these tactics have been passed on from teacher to teacher for hundreds of years, and have never been systematically evaluated; yet they continue to be an important part of the teaching activity in most classrooms. Basic courses in how to arrange materials, arrange cues, provide for drill and practice activities, analyze performance, and make effective instructional decisions are not a part of most teachers' experience during teacher preparation. Therefore, these teachers, as they begin their first years of work, teach their pupils the way their own teachers taught them -- with, perhaps, the added assistance of modern teaching materials. Very often the strategies and teaching tactics which are implemented have been drawn at random from previous experience or from their observation of a master teacher when they were in practice teaching.

In any event, it has become clear that we must pay more attention to systematic ways of evaluating teaching tactics and to improving and refining those tactics through careful evaluation of child performance.

To give merely a few examples of our findings:

Throughout our studies, the Program Project staff have investigated ways in which teachers instruct children to respond and ways in which the children's responses are fed back to them -- evaluated for them -- through immediate scoring. Many children have been taught how to record and score their own responses.

Through our investigations we have come to see that modeling is an important tactic in teaching. We found that instructional tactics must be arranged so that they are appropriate to the child's individual level of learning. If the child has difficulty responding from direct instruction, responses may be modeled by the teacher or another student. Sometimes a permanent model of the correct response can be displayed for the child to refer to as he makes his own responses. If that proves unsuccessful, actual hand shaping procedures may be used. The teacher may actually take the child's hand and show him how to make the correct response by physically forming the response.

Drill represents another critical instructional tactic. It involves the opportunity to perform a task repeatedly until the quality and fluency of performance increase to a specified level. A great deal of information has been gained by looking at drill activities. We have been impressed with the relationship between specified drill activities and instructional success. And, of course, we have looked at different ways of strengthening performance during drill procedures by the application of reinforcement principles.

Obviously, all of these instructional tactics are familiar and have been used before; however, the major finding from our research is that there must be proper timing for using these various instructional tactics -- when to use them and when to discontinue their use and move on to other procedures.

The research strategy that has been most useful has been to isolate the specified components of the behaviors of interest and to obtain a direct measure of child performance on these components. The research procedures used throughout the studies have provided precise information about the effect of instructional procedures on performance, and about the relationship of the level of learning to the instructional tactics. These are the kinds of information about teaching that have been gained through the Program Project investigations.

Developing methods for behavior management: Individual behaviors. One of the most crucial issues we have investigated is the learning environment and the use of specific arrangements and conditions within the environment in managing social behavior in the classroom. Children's attention must be focused on appropriate behavior at least 90% of the time they are involved in direct instruction. If they are paying

much less attention than that, the instructional session is less than effective. A classroom must be viewed as a social setting -- after all, children respond to other children, initiate contact with other children, and are often motivated by them. Systematic attention must, therefore, be paid to managing the social conditions in the classroom so that they elicit appropriate behavior. We have seen that this can be accomplished through an analysis of each child's learning idiosyncrasies; the conditions and events that are available to the teacher and that can be managed by the teacher and/or the students to reinforce appropriate behavior. One eventually can establish that important relationship between appropriate behavior, effective performance, and the satisfying events that are arranged to occur after the child's appropriate performance.

Another very important strategy is to place more responsibility for self-management in each child's own hands. Through teachers' systematic arrangement of reinforcing events and by their developing a behavior contract, children can become good self-managers. Of course, effort in this direction increases the productive activity of the classroom.

Developing methods for behavior management: Group behaviors.

Group behavior management is the second half of the critical issue of social behavior in the classroom. The group behavior game has been carried out under the careful measurement of the project staff and replicated several times. This simple straightforward behavior game provides a motivation for all the children to work together as a group. It increases appropriate behavior in the classroom and reduces inappropriate behavior. Using competitive and cooperative social behavior in a systematic way can have a strong beneficial effect as children try to control their own behavior and as they cooperate in the controlled behavior of their peers.

Throughout the project these strategies have increased the control of classroom behaviors. These projects have been replicated a number of times with equal success in each case, and have been applied in public school classrooms in nearby school districts.

Validating findings through evaluation of student performance. In the long run, the best way to evaluate a project is by summative evaluation of the progress made by each child and by the class as a group. The project staff have paid particular attention to the techniques used for summative evaluation of both individual and group progress. It is obvious that summative evaluation -- the evaluation of change -- validates the research findings. To be quite practical, regardless of how neat the instructional procedures, if children do not progress steadily throughout the project there is no reason to believe that the findings are valid. Nor is there reason to expect that they would lead to significant changes in instruction when applied in the regular classroom setting as opposed to the demonstration setting. So the concern of the project staff throughout has been to evaluate the program and to use this evaluative information to make decisions about modifying the total instructional program.

Organizing classrooms to individualize programs and apply research results. Complete individualization for all children in all subjects is unfeasible in most classrooms because of time and personnel constraints. Teachers are unable to measure all crucial behaviors of all children in every subject -- if they could, such a course might result in continuous data collection with no time for instruction. However, the benefits of individualization cannot be overemphasized. We must, therefore, devise ways to enable teacher to utilize their resources in order to maximize children's opportunities to learn.

One aspect of the Program Project has been to explore methods of efficiently planning instructional and behavioral programs to permit individualization and to collect and analyze data from these explorations. Applied studies demand extensive amounts of data collection and analysis over long periods of time. Efficient methods of classroom organization were necessary to enable the staff to provide total academic programs while meeting the rigorous demands of research.

One of our goals involved taking children from the Mercer Island School District into the research classroom for children with learning disabilities; establishing for each child an individualized intervention program; and returning the children functioning at grade level at the end of the year. This was a very rigorous goal and one that involved specifying performance criteria that had to be reached. In each case over the five years of the project, these criteria for change were reached, children's return successfully achieved, and follow-up of the children's program back in their own district maintained. The system that was developed, and that is quite comprehensive, provides the kind of data that the administrator can use to determine the progress of each child in all of the classrooms for which he is responsible. This system for administrative decision making functions quite effectively and has been the basis for the decisions made in the project classroom.

The Contents of This Volume

The preceding discussion of the Program Project research, and related educational issues, has merely introduced the far more detailed examinations of these topics that make up this volume. What follows, then, is a very brief summary of the following chapters.

In the next chapter, there is a discussion of the hierarchy of learning phases we identified in the course of our research. To reiterate briefly, a learner is in the acquisition stage of learning from the time he first performs a behavior until he can perform the behavior with reasonable accuracy. He is in the fluency building (or proficiency) stage from the time he can perform the behavior accurately until he can perform it accurately at a desired rate. The learner is in the maintenance phase when he can perform the behavior accurately and fluently after some interval without practice. He is in the generalization phase when he can perform the behavior fluently in situations that differ from

the practice situation. Finally, the learner has reached the application or adaptation phase when he can ascertain the need to perform the behavior and change the behavior to fit a new situation.

This hierarchy of learning stages has meaning for both the classroom teacher and the educational researcher, and these issues are addressed throughout this volume. The teacher who is cognizant of these levels in the learning process will be able to assess the performance of his or her pupils more accurately. Instead of merely saying a pupil does or does not know subtraction facts, for example, the teacher will be able to pinpoint the exact problem. Perhaps the pupil performs accurately but very slowly; or he has performed accurately and fluently in the past, but cannot do the problems today. Using our research, the teacher would know that in the first instance the pupil is in the acquisition phase and needs certain kinds of help; in the second, he needs still other help in order to reach the maintenance phase. In addition to helping the teacher with assessment, this knowledge will also be useful to him or her in planning teaching strategies. Our research has shown that certain teaching techniques are more appropriate at certain levels in the hierarchy. The chapters of this book dealing with specific curriculum areas contain information about specific techniques.

Other educational researchers should also find these ideas interesting. First, the existence of a hierarchy of levels of learning opens up wide vistas of needed research. We need to know more about the levels of learning themselves. How many are there? How can they be accurately and precisely defined? We also need research to "match" each level of learning with the most effective teaching techniques for that level. Second, knowledge of the different levels of learning will help in designing and replicating specific research studies. Results of studies with children can be accurately interpreted only if the phase of learning the children are in is known. Studies can be more accurately replicated if there is information concerning which phase of learning was being investigated.

The next few chapters deal with basic curriculum areas. Since we as educators believe that the goal of education is to help children attain the competencies necessary for adult life, we focused our research on those subject areas most necessary in adulthood: "the three R's." In each of the basic areas we have pulled together a set of teaching strategies and techniques keyed, whenever possible, to the appropriate phase(s) of learning.

The research on teaching techniques in the various curriculum areas was carried out at the Experimental Education Unit, University of Washington, by teachers working with handicapped and learning disabled children. But the application of these techniques should not be limited to special education. We have shown that our children could make exciting progress when instructors used the methods described in this book. How much more progress could be made by "normal" children if their teachers used these ideas.

Reading Chapter

Learning to read is one of the most important educational steps a child takes. The child who cannot learn to read (or, perhaps, is not taught effectively so that he can learn to read) is at a disadvantage in every other curriculum area as a student; he is also hampered as an adult in our culture, which still depends so much on the written word for disseminating information. So children who are experiencing difficulty in learning to read deserve prompt and effective help.

There are many prescriptions for reading difficulties -- some traditional and some "new-fangled," but very few of these remedies are based on solid research. The program in the reading chapter is backed by data showing the methods have actually increased the reading rates and comprehension of our pupils and helped them advance to reading at grade level.

The first step in helping a child is to assess his difficulties and place him accurately in material that is neither too difficult nor too easy. The authors of this chapter, Eaton, Hansen, Haring, and Lovitt, present norms for judging the correct level and both a long and a short placement procedure.

The strategies for teaching once the child's initial placement level has been determined are divided into sections appropriate for the different levels of the learning hierarchy. First come ways to improve decoding skills, both in isolation and in reading in context. Then there are several techniques for improving comprehension. When both accuracy and comprehension are up to stated goals, the next step is to build fluency and to bring the child up to reading at grade level. "Contingent skipping," a program for rapidly moving a child to grade level materials, and "movin' on," a program for building fluency and independence in grade level reading, are described.

The last section of Chapter 3 is concerned with evaluation. Teachers need to make constant checks to see if the child is learning the particular skill being taught, and also to see if long-term goals are being met. Teachers also need to evaluate pupil progress to know when a child is ready for more difficult material. Ways of analyzing the data collected while using our teaching techniques are presented so that teachers can make the necessary judgments.

Writing Chapter

Writing is the second basic curriculum area covered. Looking at the subject from the point of view "What is necessary for adult competency?" the author, Cheryl Hansen, has broken the subject down into three main components -- penmanship, spelling, and communication of ideas.

All the jokes linking illegible writing with intelligence notwithstanding, penmanship is a necessary skill. Ms. Hansen has outlined a

complete penmanship program from placement to building fluency. Alternatives to the deadly dull drills that have given penmanship a bad name with students and teachers alike are given. Since marking penmanship can be subjective at best and inconsistent at worst, teachers should be very interested in the section on correcting and scoring papers. Various teaching techniques for both the acquisition and mastery stages are included.

The spelling part of Chapter 4 starts with a section on making the spelling program meaningful to the students involved -- individualized so that no student continues to drill on words he has already mastered or leaves behind a word he has not yet learned. How this can be accomplished using either standard spelling texts and word lists or with teacher-made lists is described. The chapter section ends with various teaching techniques, rules for their use, and examples showing their application.

Communication of Ideas is the third basic area of writing. It is probably the hardest skill to teach and the most necessary for students to learn. It is also an area of disagreement among educators regarding what to teach and how to do it. How should teachers mark papers? Should the mechanics of writing or thought content be corrected? The results of some studies we and others have done on these controversies may help teachers to make informed choices while teaching writing skills.

Arithmetic Chapter

What do you, a teacher, do the first week in September? You are faced with X children and expected to teach them arithmetic. Your first instinct is probably to find out what they already know -- and quite correctly. Placement is the first topic in the chapter; placement will be accurate only when an assessment process has been carried out. A technique for pupil assessment is described.

After the child's performance has been assessed and he is placed at a level of problems neither too easy nor too difficult, the teacher must decide exactly what he or she expects the child to be able to do before he can be moved to another level. Ways of arriving at an appropriate goal and means of expressing the goal are covered.

Teachers will be pleased to note that the next section of Chapter 5 contains many concrete examples and suggestions for planning an arithmetic program. Dr. Lovitt explains several overall teaching designs which can be used. He also gives information about several strategies for deciding when to make a change in techniques or skill level for a child.

The next section looks at the acquisition of arithmetic skill in terms of our hierarchy of phases of learning. Many examples from research studies of specific teaching techniques that worked in particular phases of learning are given.

No matter what arithmetic operation is being taught, no matter what textbook series is being used, sooner or later the student runs up against story problems. Often, even though he could work the equation were it presented without the verbiage, he fails to solve the problem correctly. Dr. Lovitt worked out a technique for classifying story problems and ordering them for teaching. Then he used a specific set of techniques to teach the problems. The results of the study should give teachers good ideas for presenting story problems to their classes.

Classroom Management Chapters

The preceding curriculum chapters are oriented toward teaching specific subject matter using the Applied Behavior Analysis method. Any teacher reading that section would be rewarded with many specific ideas to use in his/her classroom. But someone to whom these ideas are fairly new might be overwhelmed at the idea of trying to implement a whole new methodology of teaching. Terms such as "baseline," "performance objective," and "acceleration and deceleration lines" -- not to mention the constant stress on data collection -- might scare away some and cause others to hesitate. "What is the point of collecting all those data? What do I do with them?" might be one teacher's query. "How can all my students' behavior be improved so that I can spend more time with individuals?" might be another's. "How in the world can I handle individual programs for thirty students in several subjects"? There aren't that many hours in a day" might be the reaction of a third. Take heart -- these topics are covered in the final chapters of this volume.

In Chapter 6 the teacher will find the whys and wherefores of data collection. The benefits of systematically collected data are set forth from the point of view of student, teacher, and administrator. Some helpful sections on the kinds of data that can be kept for various purposes and how to go about collecting them are included. But the meat of the chapter consists of showing the teacher how to use data to analyze pupil progress and program effectiveness. This section includes ways to arrive at goals for pupils and to measure their progress toward those goals. Teachers learn how to make data-based decisions for program changes by applying rules we have formulated in the course of our research. Helpful as these rules are, they were not handed down on Mt. Sinai, and we hope other researchers will help in their validation or further formulation.

Chapter 7 guides the teacher in establishing our methods in his/her classroom. Before a teacher can have individualized instruction in the classroom, two things are necessary -- planning and students whose behavior is appropriately tuned in to learning. Help is given in both areas. Suggestions range from things teachers can do to affect student behaviors, ways students can be helped to become self-managers, and techniques for working with group behaviors. The second section of the chapter has to do with planning, from yearly master plans to daily plans for each student.

Chapter 8 deals with ways of handling some of the inappropriate behaviors -- the naughty behaviors -- that turn teachers prematurely

grey. Dr. Lovitt gives some of the reasons why some teachers fail in their attempts to control some behaviors. He makes several recommendations regarding steps teachers can take before they resort to specific techniques. Following these procedures may make further intervention unnecessary.

But if further measures are needed, specific methods of attenuating behaviors are detailed. One section describes ways of dealing with a whole group in terms of group contingencies -- reinforcing when the inappropriate behavior does not occur or when the correct behavior does occur, for instance. The next section concerns ways of handling individual behavior problems, again with techniques that involve giving something or taking something away. The last section gives help in selecting an appropriate technique.

As we noted earlier, this volume should have practical implications not only for other educational researchers, but also for classroom teachers. Of course, it is not strictly a methods text -- a "cookbook" of ideas for the teacher. It is also the report of ten years' research. It essentially translates the results of research into workable classroom strategies and tactics. We hope that it helps to make teaching a more enjoyable, meaningful, and rewarding experience for teachers.

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CHAPTER 2

SYSTEMATIC INSTRUCTIONAL PROCEDURES: AN INSTRUCTIONAL HIERARCHY

Introduction

Learning may be conceived as the ability to perform new skills in progressively more complex situations. When a new behavior is added to a person's repertoire, he/she must first acquire the behavior. Then he/she must learn to perform the required behavior fluently and maintain the ability to respond when instruction is no longer provided. In addition, a person must be able to generalize and adapt the skill to fit new situations before it is fully integrated into his/her repertoire. These five levels of performance may be thought of as a learning hierarchy.

Educators of both handicapped and normal children could become more efficient in planning and instruction if they had systematic guidelines to use in selecting instructional procedures. For some teachers the selection of procedures is unsystematic -- almost random. When procedures are selected by whim or superstition, instruction is inefficient and teachers have difficulty evaluating the effect of their actions on children's performance. In other situations teaching procedures may be rigidly prescribed, and teaching methods inflexible, so there is no opportunity to alter instructional procedures to accommodate individual differences in pupil performance. Obviously, a definite need exists to establish a system for choosing instructional procedures which have a high probability of success, but which can be easily monitored and modified to meet individual needs.

Empirical validation of procedures, concepts, and distinctions directly affecting teaching has resulted from research into the nature of learning. The theory of distinct levels of cognitive operation and the processes of assimilation and accommodation formulated by Jean Piaget (1950) have influenced recommendations on the introduction and sequencing of certain concepts, notably mathematical, and the development of new methods of psychological and educational testing. Bloom's (1971) hierarchy of logical thought processes has resulted in new methods of questioning students and programs designed to teach specific cognitive skills. The hierarchy of behavioral development from single reflexes through complex behavior chains, proposed by Gagne (1970), has affected procedures used to teach new skills, analyze tasks, and the development of educational materials. Application of these hierarchies to practical educational pursuits is certainly incomplete, yet it is obvious that such comprehensive theories will contribute to the field, especially as a means of unifying the results of detailed empirical research.

The relationship between developmental and skill hierarchies and a hierarchy of learning stages for each skill area has not yet been adequately explored. No skill is learned "instantaneously." There seem to be distinctly different types of learning in the development of each

skill through the stages of acquisition, proficiency (fluency-building), maintenance, generalization and application. Certainly the learner's progression through these various stages of learning could drastically affect the appropriateness of movement through a more general skill hierarchy. For example, a child who has not yet acquired basic decoding skills probably should not be in a program which emphasizes inferential comprehension. Similarly, it is unlikely that all the various strategies and tactics which influence learning are equally appropriate during each learning stage.

Perhaps development of standard procedures to attend to the various stages of learning has been neglected because such procedures contradict the concept now in vogue of "cognitive style." Teachers are encouraged to "discover" teaching procedures that best suit them and their students. The tendency to ignore this critical link between research in skill hierarchies and research in learning occurs at the expense of both the student and the teacher. Empirical validation of specific teaching strategies which might possibly serve as facilitators for each stage in developing individual skills is imperative to prevent guesswork from influencing the ultimate success or failure of pupils.

The following conceptualization of a learning hierarchy is largely hypothetical. It was not our original intention to investigate this hierarchy when Program Project research was initiated. However, our concern with frequency or rate of performance prompted an intense interest in the relationship between a child's proficiency on a skill and his retention of that skill. As we began to collect data, it became clear that our children did seem to perform differently as they "learned" each task. Procedures which were tremendously successful for children who did not have a skill in their repertoire no longer worked when they were trying to apply that skill. We did not formulate and investigate questions based on a preconceived hierarchy, but rather, the hierarchy emerged as a result of research.

The remainder of this volume will detail the possible uses of such a model for a number of curricular areas and outline some teaching procedures which have been validated. These results are just the beginning of the research which will need to be undertaken to explore the ramifications of the instructional hierarchy.

Acquisition

Acquisition has often been equated with the overall learning process, but is actually only the first step in learning a skill. Demonstration of initial performance is but the first of a series of learning stages culminating in the total development of a skill which can be maintained and applied in diverse situations. Acquisition is the period between the first appearance of the desired behavior and the reasonably accurate performance of that behavior.

A specific level of performance accuracy has become a common criterion of skill acquisition. If a learner responds to a task correctly only once, we cannot comfortably say that he has acquired the behavior. A skill is not acquired until it becomes a functional part of a student's behavioral repertoire.

The emphasis during the acquisition stage must be on accuracy. Acquisition of an unknown skill for both normal and handicapped children usually begins with the child making frequent mistakes. A child learning to walk falls many times between his first steps and the day he walks without aid. Young readers may erroneously decode many words before they can read independently.

Different levels of accuracy may be acceptable for different skills. For example, some skills -- such as spelling one's own name -- should be performed perfectly, while a lower accuracy level might be acceptable for other skills, such as spelling the names of unknown persons.

Teacher methods courses and research studies provide teachers with ideas and procedures to aid acquisition of unknown skills. Two widely used techniques for initial acquisition are demonstration and modeling. Demonstration may be defined as the teacher's active performance of a skill. Modeling, on the other hand, involves presenting an example of a skill, or a pattern of response to follow.

Teachers often demonstrate math problems, solutions on the blackboard, leaving this example of how to work the problem as a model for students to use as they solve similar problems at their desks. When acquiring printing skills, a pupil may copy a model of a letter; or gain cues to help him correctly form a letter by watching the teacher or a peer write.

Empirical support for the use of demonstration and modeling has appeared in the literature (Smith, 1973; Eaton, Lovitt, Sayre & Lynch, 1974). Smith (1973) found that demonstration and modeling were effective methods to teach math skills to learning disabled children. Acquisition was rapid for all children when these procedures were used. Reinforcement combined with demonstration and models has resulted in children's successfully acquiring imitative behaviors (Lovaas, Berberich, Perloff & Schaeffer, 1971; Baer, Peterson, & Sherman, 1971). * Researchers have applied these procedures to a wide range of behaviors.

* It should be noted that some children require instruction that goes a step beyond demonstration and modeling to physical shaping of responses. For instance, some severely handicapped children, or children who have not acquired the ability to imitate demonstrated behavior, may need hand-shaping and physical prompts and assistance to the point where they can make the desired response. The instructor, for instance, may need to shape a grasping response so that the pupil can eventually pick up and hold a pencil or crayon by himself.

However, most research on skill acquisition has failed to distinguish that stage from subsequent levels of development (fluency building, maintenance, generalization and application). As a result, there have been no guidelines that suggest when procedures such as modeling, cueing and demonstration might best be terminated in favor of more appropriate fluency-oriented instructional procedures.

Fluency Building (Proficiency)

After a skill has been acquired, the emphasis in the learning process shifts from acquisition to proficiency or fluency building. The learner at this stage is capable of correctly responding to a task, but has not yet attained the degree of fluency necessary to use the skill in meaningful ways. The difference between acquisition and fluency may be illustrated by considering the child who diligently sounds out each word compared with the child who decodes smoothly and quickly without hesitation. Both students may be extremely accurate readers; however, the first child is still acquiring the mechanics of unlocking each word while the second child has mastered basic decoding skills and is able to concentrate on the meaning of the story.

Once acquired, a skill must be mastered or performed proficiently if it is to be functional in the individual's environment. It is not enough merely to perform a skill; one must be able to perform it fluently and competently if the skill is to serve one well in all circumstances. The use of behavioral objectives, and the continuing importance of grades, illustrate the demand for skill proficiency in education, especially for basic skills. The recent onslaught of criterion-referenced tests support the concept of skill mastery. Whatever the definition of criterion levels, they involve not only correct performance of a behavior (acquisition), but its production at some objectively set level (fluency). Skill proficiency may not be definable except in terms of the role that the particular behavior will play in the individual's development. Each of the following may be definitions of proficiency or fluency:

- a) The performance of a skill at some level which insures maintenance of that skill. For example, reading a word such as "danger" is a skill that must be learned so well that it will never be forgotten.
- b) The performance of a skill at some level which insures success in later or related tasks and skills. For example, the sounds of consonants should be learned well enough to facilitate their use in sounding out words.
- c) The performance of a skill at some level comparable to that of others and/or peers. For example, an individual applying to medical school must be able to balance chemical equations as well as others competing for entrance.

Certainly additional definitions may be necessary. However, the specific skill-related definition of each proficiency level will probably be determined through empirical research and a diagnosis of individual learner needs. It appears that, in general, during this stage of learning, simple antecedent events which provide opportunity for drill and repeated practice of a behavior might be sufficient to facilitate building fluency in a skill.

One of the foremost principles in education is that we "learn by doing." Drill is essentially based on this concept. Early research on drill, summarized by Gates (1917), indicated that requiring active, repeated responding (recitation) increased learning. Michael and Maccoby (1961) found that overt responding by a pupil also increased learning more than covert responding. Additional evidence to support the need for overt, repeated responding for learning is found in the work of Holland and Kemp (1965) and Krumboltz (1964).

Studies completed at the Experimental Education Unit indicate that drill is extremely effective in teaching a wide range of responses, from oral reading to manual communication. Eaton and Hirsch (1974) found that drill on error words greatly improved the performance of poor readers. Error drill was more effective than drill on new words alone, however. McGuigan (1974) found that some children benefit from routine drills during acquisition and novel drills during the fluency building stage.

Reinforcement also seems to be an important part of the fluency building stage. Practicing learned skills to become proficient, like practicing piano scales, can be a repetitious task. Reinforcement often provides the necessary motivation to continue practicing.

As with research on acquisition, studies investigating mastery performance do not distinguish mastery from other levels of skill development. Measures of retention are often used as an indication of mastery --clearly a confounding factor in interpreting results. The ability to perform a skill fluently and the retention of that skill over time are clearly separate but compatible issues. Drill may promote proficiency in some skills, but may not be an effective or efficient means to promote retention. Pupils may be able to perform a task fluently and accurately, without the ability to recall it later. Instructional procedures appropriate for fluency-building and maintenance may differ.

Treating these two stages of learning as one may not be detrimental to the ultimate utility of a skill; however, attending to each stage separately may enhance learning, and may affect the timing for introducing other skill tasks. Limits and observable characteristics of proficiency (as opposed to maintenance) need to be defined and specific instructional procedures appropriate at each stage in a child's development should be delineated.

Maintenance

Once a pupil has learned a skill, educators must ascertain if the pupil will retain and maintain the skill over time. A child should be able to demonstrate that previously established level of performance can be replicated under essentially similar conditions after a period during which there has been no opportunity to respond. The relationship between proficiency and maintenance is less well conceptualized than is the relationship between acquisition and fluency building.

The most common procedure recommended to facilitate retention is overlearning. Overlearning occurs during repeated drill "beyond the point where immediate and complete recall is first possible" (Travers, 1967, p. 317). Many experimental studies, some completed over forty years ago (Krueger, 1929), have shown that overlearning improves retention. These studies support the use of drill to facilitate skill mastery and maintenance.

Meaningful material, as opposed to nonmeaningful material, has also been recommended to promote retention. Meaningful words are learned faster and retained longer than nonsense words (Underwood and Shultz, 1960). The material may be familiar to the student (such as a poem utilizing familiar words), or it may have many associations for the student. Finally, the material may be easy to organize. The confused definitions of meaningfulness have produced unclear research results. Basic studies have found one answer, but replications have produced conflicting results (Katona, 1940, 1942; Hilgard, Irvine & Whipple, 1953).

Repetition does improve retention of organized meaningful material as well as of rote tasks (Ausubel and Youssef, 1965; Slamecka, 1960, Gilbert, 1957). Repetition through increased trials and days to criterion improves maintenance (Stinnet and Prehm, 1969; Eaton and Swenson, 1972). Finally, a high fluency level set for performance of a skill may insure skill maintenance (Liberty, 1974a).

Maintenance of previously taught skills is obviously important to educators. Research has provided clues for developing instructional procedures to facilitate skill retention. Although this topic has provided more research relevant to instruction than others, many questions are still unanswered.

There is often confusion between maintenance and other levels of development, such as proficiency. If the stage of learning that leads to maintenance of skills is treated separately, perhaps specific alternative instructional tactics will be developed. Drill may be an appropriate tactic to insure maintenance. However, types of drill other than those appropriate for developing proficiency may facilitate the retention of skills.

It would appear that in many cases a degree of fluency (i.e., "overlearning") will assure maintenance. Simply continuing to provide drill until some level of "proficiency" is reached may insure maintenance. Yet maintenance of a skill is not achieved in many cases where

drill has been used. Liberty (1974a) demonstrated that although drill was effective during acquisition, practice had little effect on the retention of spelling words. Therefore, one must conclude that either we do not yet know what performance levels are necessary for proficiency, or that additional instructional tactics are required for maintenance. Perhaps maintenance of behaviors will be facilitated if procedures which include intermittent reinforcement, complex stimulus situations, or complex chaining procedures are provided.

Generalization

There is no guarantee that a child can respond fluently in complex and unfamiliar situations even after he/she has demonstrated the facility for maintaining a specified response in a restricted situation. A child who is fluent in two-term, single-digit addition facts may or may not be able to respond appropriately to such problems when they are presented on a page with other problems involving subtraction. Alternatively, the child may or may not be able to recognize addition problems when they are presented in other formats such as within the context of story problems, or in situations outside the classroom. Both of these situations relate to the question of generalization.

As educators, we assume that skills we teach and knowledge we convey will be useful to the student throughout his educational environment. We also expect that many behaviors will be useful to the student as a member of society. For example, writing is not taught solely so that the student will be able to write English in school; it is also taught so that he will be able to communicate effectively in his daily life. In addition, we assume that a skill learned at one level or grade in school will be generalized to other levels or to other skill areas. A child who spells words correctly on a spelling test will, hopefully, spell those same words correctly in a report. Generalization can be defined as performing a skill in response to new stimuli similar to those used during instruction. The actual response remains the "same" as the one learned; however, the stimuli change. This definition, based on the empirically developed idea of stimulus generalization, may be slightly different from that of some educators, but the underlying concept of generalization is similar in both instances.

Clearly, it is quite probable that different instructional tactics would be required to teach generalization of skills than those tactics appropriate at other stages of learning. The point at which a child is ready to begin this phase of learning, however, is unknown. It may be, for example, that procedures designed to enhance cross-situation generalization should begin concurrently with procedures designed to enhance maintenance.

Practice is often recommended to foster skill generalization. Most authors, however, fail to distinguish between practice and drill, although a functional distinction can be made. While drill is the directed repetition of the specific response to be learned, practice

includes utilizing the learned response with other learned responses to solve a variety of problems. Responses remain identical to those learned, although the stimulus for the behavior varies or is combined with stimuli for other responses. Two types of practice might be identified from the results of empirical research. One type of practice is called discrimination training. The pupil is taught to make a specific learned response in the presence of certain stimuli, but not in the presence of others (Catania, 1968). For example, the skill of addition is taught so that it will occur in the presence of a "4" but not in the presence of a "X". Practice of this type of addition involves presenting students with numerous opportunities to respond appropriately to both symbols. Generalization might be "tested" by presenting students with problems having both "+" and "x" symbols. Another example of practice might be requesting a student who has mastered counting chips to count pennies, apples, and nails. Generalization, and the effect of practice, can be examined by presenting other objects or symbols for the student to count.

Another type of practice, differentiation, is based on research in stimulus gradients (e.g., Catania, 1968). This research suggests that response generalization can be facilitated by reinforcing responses to stimuli while varying one essential aspect of those stimuli, such as duration or intensity. These results indicate that practice of another type should focus on that particular aspect of the stimulus which is important. Engelmann's (1969) statements about the teaching of concepts are based on this principle. This type of strategy might involve repeated presentation of items that have "corners" with those that do not, as the student responds orally to questions about corners. Generalization of the student's skill in identifying corners could be tested by presenting a "new" item and asking if it had corners. Practice of this kind is routinely used in physical education: students practice catching balls of different sizes to facilitate generalization to many other sizes.

The use of these two types of practice (discrimination and differentiation) to facilitate generalization in instructional settings is based on empirical research of specific response learning. Kersh (1962) found that a group which practiced rules did better on measures of retention and generalization than did other groups trained in a "discovery method." Guthrie (1967) found that subjects taught by the "practice rules" procedure were able to apply that rule to new principles better than subjects taught by the discovery method. Briggs and Hamilton (1964) after a review of the relevant research, concluded:

In general, when tasks lend themselves to much internal cognitive structuring, the function of practice is to provide the occasion for such structuring. For rote learning, the function of practice is to provide relatively more instances...in order to strengthen the desired response, to dissociate it from conflicting responses, and to bring disinhibition.

In summary, research has pointed the way for instructional procedures to facilitate generalization, based on discrimination and differentiation training, and on repeated presentation in order to enable the

student to form the rules and associations which are the basis of generalization. However, the confusion between the different tactics of drill and practice suggests that further research must investigate the relationship between specific instructional procedures and the generalization of basic educational skills, within traditional educational settings.

Application or Adaptation

Skills are nonfunctional unless they are usable in modified form in response to new problems or in new situations.

We can teach children to say "Please" and "Thank you" with little difficulty. They can also be taught to generalize those terms to a variety of appropriate contexts. Learning to modify and use new expressions for "please" (e.g., "I would appreciate it if...") and "thank you" ("I am grateful") requires skill adaptation. A person who is facile in skill adaptation can easily discriminate the need to emit a particular type of response and determine the specific form of the response required -- even if it is slightly different from any response used before.

Educators cannot teach specific behaviors for each environment or problem the student is likely to meet. The student must retrieve and adapt appropriate responses from those in his behavioral repertoire. The individual must discriminate both the key elements in a situation and the appropriate response to those stimuli. These are "two basic component behaviors demanded by complex tasks" (Barrett & Lindsley, 1965). For example, when a person is driving a car, he can make several (learned) responses when a car in front of him stops suddenly. He can turn, swerve, brake, or accelerate. The discriminations necessary for an appropriate response decision must be made very quickly in order to solve the "problem."

Other situations also require modification of learned skills. In school, a pupil learns to write, to become fluent in using writing skills in school tasks, and, one expects, to generalize this skill to other situations (e.g., filling out job application forms). However, if the pupil breaks his "writing hand," he must perform the skill of "writing" -- in all situations -- with the other hand. The response is a modification, adaptation, or application of the specific learned skill, based on changed or new stimuli.

Procedures designed to affect one aspect of behavior can often affect other (non-programmed for) similar responses (Baer and Sherman, 1964). Variations of a response can be trained under different types of reinforcement schedules (Catanal, 1968). However, what aspect of a response, or what related responses would be affected, cannot be defined in terms of a particular individual and a particular procedure.

It is fair to say that without these adaptation or application skills -- without the ability to modify or adapt behavior to the demands of a new situation -- an individual has only limited control over his behavior and environment. He has virtually no way to extrapolate, to predict, to make deductions, or to reason. Although, as we said, educators cannot teach specific behaviors for every situation a student is likely to encounter, they do have a critical responsibility to insure that their pupils learn how to adapt. Adaptation of skills does not "happen." A recent study at the Experimental Education Unit demonstrated all too graphically the need for adaptation training of even the most rudimentary behaviors. Brush and Gray (1974), working with a mildly retarded young girl to develop her ability to make eye contact, found that when no attempt was made to elicit application or adapt the behavior to new situations outside the experimental training sessions, virtually none occurred.

With adaptation, possibly because it is the most complex level in the hierarchy of skill development, we begin to see some erosion in the parallel of hierarchies. While it is possible to show that certain instructional procedures "match" certain earlier stages in skill development, there is no sure "match" for promoting adaptation. In the acquisition, fluency building, maintenance, and generalization stages of a student's skill development, an educator can focus on relatively discrete tasks; but, by definition, to adapt and apply skills in wider contexts means to move away from the discrete and specific.

Facilitation of skill adaptation has often been achieved through provision of opportunities to meet as many new and different situations as possible. This strategy provides students with opportunities to practice appropriate modification of previously learned skills in the solution of new problems. Adaptation may then be related to problem solving. People use many different strategies when confronted with a problem. Guessing is the most common method (Bruner, Goodnow & Austin, 1961); however, Ray (1957) found that asking the student to verbalize his strategy in problem solving often reduced inefficient trials. Students who were led through a systematic pattern of problem solving were also able to solve a task in a significantly fewer number of trials than a control group (Goodnow and Pettigrew, 1956). Whimbey (1974) reported similar work by Bloom and Broder in teaching analytical thinking.

The effect of feedback on an individual's ability to solve problems needs to be investigated. In a recent study at the Experimental Education Unit a pupil received immediate feedback on his work by having his math worksheet corrected as soon as he finished it. He then reworked the problems he had missed. Mastery was achieved in all one-column addition work in six or fewer days; the pupil quickly adapted his skills to more difficult, two-column add facts, reaching criteria quickly without further instructions (Hite, 1974).

Some research on the use of adaptation has investigated the effects of practice when irrelevant though "realistic" cues are present. Overing and Travers (1967) found that practice in a realistic situation facilitated adaptation and application in new situations. Anderson and Faust (1973, p. 375) have stated that "Later in instruction, when the

goal is to teach the student to generalize in a broad range of situations, realism and a wide variety of examples should be employed."

Adaptation is often used in occupational training courses, where learning steps are designed to help the student meet specific requirements he must face on the job. Simulated problems are presented as tests of the learner's ability to adapt and use skills in a "real" situation. With ingenuity, educators could devise a variety of situations to test application and identify appropriate teaching procedures and methods. Certainly research has indicated some useful procedures such as asking the learner to verbalize his strategies and using structured teaching situations; however, research investigating the relationship between problem solving and adaptation must be extended.

Research issues in this area are clouded by difficulties in defining the process of problem solving, testing an individual's problem solving ability, and developing procedures which facilitate it (Travers, 1967). Problems themselves can be variously designed and this variety is an indication of the potential scope of research. Kathryn Blake's excellent discussion of the dimensions of problems and of problem solving as an instructional procedure merits further attention. Some of the procedures she mentions for teaching pupils to solve problems are brainstorming, inquiry training, training for originality, training for associative fluency, instructions, and instructional programs (Blake, 1974). Clearly, the need for systematic investigation of these procedures as means to promote adaptation is critical. Finally, investigations designed to answer these specific research questions will ultimately decide whether or not the skills taught within the educational setting are fundamentally worthwhile in the larger community.

Summary

The ultimate goal of educational research is to increase the efficiency of the teaching-learning act. The delineation of the various stages of learning -- including acquisition, fluency building, maintenance, generalization and adaptation of skills -- so that teachers can discern a pupil's progress through these stages will enhance this goal. Teachers can implement instructional tactics which facilitate pupils' progress through the learning hierarchy.

Figure 1 summarizes our current conception of the emphasis and strategies which appear to be most useful at each level of the learning hierarchy. When pupils are acquiring new skills, teachers could employ a single strategy or a combination of techniques including: demonstration, models, cues, or routine drills. These instructional procedures have a high probability of improving accuracy of responding. Students who perform accurately but slowly may benefit from novel drills and/or reinforcement. Provisions for checks on the maintenance of a learned behavior are necessary to ensure that deterioration of a skill does not occur. Programs to enhance generalization and adaptation may include discrimination and differentiation training, problem solving, and simulations.

Figure 1 about here

Ultimately, generalization and adaptation have the most profound implications for life. Teachers are available to assist pupils in the early stages of learning, but cannot follow them throughout their lives to help them apply a skill to every new situation or problem.

When children learn to generalize and adapt learned skills, the teacher's energy can be conserved as pupils accept more responsibility and independence in teaching themselves. In a sense, learning to generalize and adapt skills really means to become one's own instructor. Self-instruction includes four components. First, relevant aspects of a problem situation must be discriminated. Second, appropriate tactics for solving the problem must be selected from one's repertoire. Third, the results of a problem solving strategy must be monitored in some manner. Finally, a person must be ready to change tactics or revise estimates of the situation at all times.

Teachers often encounter pupils who are not able to retain what they learn from day to day or are unable to apply skills to new situations. For example, pupils may learn complicated addition problems in school, but are not able to tally the amount of their purchase at the local grocery store. Systematic procedures need to be devised to teach maintenance, generalization, and adaptation. Bright or normal children seem to be able to maintain, generalize, and adapt learning on their own; many teachers expect similar behavior from handicapped pupils. It is clear, however, that these expectations are not realistic for all children. There is a compelling need to conduct research into the specific teaching procedures which can facilitate each stage of the learning hierarchy.

Continuing Research Needs

Verifying the effectiveness of various instructional procedures as they relate to learner progress through stages of learning may illuminate certain inconsistencies in previously conducted research on learning. It has been noted that apparently precise replication of certain research studies frequently fails to produce equivalent results. For example, in one case, the use of "feedback" might be found to increase pupil performance while in another case the same procedure might fail to have significant impact. This discrepancy may be explained if the subjects in each case were in different stages of learning. Feedback during a pupil's acquisition of skills might be very important, while in higher levels of skill development the pupil might be quite capable of discerning correct and incorrect responses and only need motivating contingencies to increase his fluency in using the skill.

Through research, general strategies of instruction must be identified which are both effective and efficient facilitators of growth during each stage of learning. But we know that the confusion between

the various stages of learning has often rendered research results difficult or impossible to interpret. For example, does "over learning" through drill promote generalization and adaptation, or are specific types of practice required for those last two stages of learning? Until we know precisely when one stage of learning has been completed and the next stage begun, it is difficult to give exact answers to many instructional questions. Nevertheless, it is imperative that teachers become aware of instructional strategies which influence the child's development across the broadest range of skills and learning stages.

Once general instructional strategies which apply to a wide range of circumstances have been identified, more detailed questions regarding the relationship between specific instructional tactics and certain types of skill development could be entertained. For example, oral drill may be superior to written drill in helping children attain mastery of some types of behaviors but not others. Alternatively, "overlearning" may have beneficial effects on the maintenance of certain skills but specific practice may facilitate other skills.

Finally, after research has investigated the general and specific instructional procedures appropriate for the various stages of learning and for the wide variety of discrete task levels to be taught, it will be necessary to investigate systematically any learning that involves a number of skills at the same time. We may find that certain skills must be fully developed (to the stage of adaptation) before subsequent skills may be introduced into the curriculum. Some skills may best be taught concurrently with others. Finally, it may become apparent that a functional interaction exists between instruction provided during the acquisition of one skill and attainment of mastery in a previously acquired skill.

Simply stated, it is essential that we determine how a teacher can identify the stage of learning in which a child is presently functioning; and how he or she can determine which general instructional procedures are appropriate to that stage, and which specific instructional tactics will best facilitate the child's continued growth.

Implications for Education

The daily demands made on teachers and the education system are enormous. Charged with individualizing instruction for students, today's teacher is faced with an avalanche of information from which to draw assistance. However, information on instructional strategies for specific stages of learning is not yet readily available.

Research into fundamental educational procedures which can efficiently and effectively facilitate skill acquisition, mastery, maintenance, generalization and adaptation will provide information for immediate use in the classroom. The research will not yield theories or suggestions nor will it yield procedures and materials for very special situations. Rather, it will result in an empirical basis for common teaching procedures that can be applied in a wide range of situations.

Not only will teachers benefit from this information, but each child will have the opportunity to learn in an environment in which instructional procedures can more predictably insure his success. A Such individualization results when the teacher can gauge correctly the pupil's present level of performance and his precise location in any particular skill's development -- for instance, whether he has merely acquired or is fluent in computation of three-column figures. The teacher must also be skilled in tailoring the instructional program for that child to his instructional needs -- in short, "appropriately" designing his education (as recent legislation has mandated). To ask a teacher with many pupils in a classroom to juggle many individualized programs at that level of sophistication without some guidelines is asking a great deal. Yet the variation in ability that one finds in a class of "normal" children -- and the effort involved in individualizing instruction -- is compounded by the introduction into regular or special public school classes of many children formerly segregated because of their handicaps. Now more than ever teachers will need all the help that educational research can offer.

The research necessary to validate the learning hierarchy model and to develop the proposed sequence of instructional procedures has just begun. The remaining chapters in this book will illustrate how educational research can be applied in the classroom and how the use of the hierarchy model can facilitate a teacher's overwhelming task of helping each child realize his full potential to learn.

Figure 1

Learning Hierarchy

<u>Level</u>	<u>Emphasis</u>	<u>Strategies</u>
Acquisition	accuracy of response	1. demonstration 2. models 3. cues 4. routine drill
Fluency or Proficiency	speed	1. repeated novel drills 2. reinforcement
Maintenance	retention without cues	1. drill and practice 2. overlearning
Generalization	novel stimulus	1. discrimination training 2. differentiation training
Adaptation	adapted response	1. problem solving 2. simulations

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CHAPTER 3

READING

"Learning to read is the most difficult and revolutionary thing that happens to the human brain," John Steinbeck, 1970.

Introduction

The reading process is a blend of many separate skills working in harmony. If one skill or a cluster of skills is missing, the entire process breaks down and the child is unable to read and comprehend.

Reading remains one of the most important skills we teach children in school. In spite of the advent of television and radio and the explosion of supplementary media, the written language is still the basis for communication. People must be able to read to understand the world around them, as well as perform practical living skills such as reading recipes, directions or traffic signs. Persons who fail to learn to read proficiently are at a severe disadvantage in our technological society.

When teachers encounter children who do not read even though all instructions in the teacher's manual have been followed and all exercises in the workbook have been completed, they may turn to experts in the field of reading for advice. Educators, clinicians, reading specialists and doctors argue vehemently about causes of reading problems. Some like Frostig (1965) argue that the child lacks the appropriate perceptual motor skills. Others such as Delacato (1966) posit that reading difficulties stem from poor neurological organization. Some, more psychoanalytically oriented, assert that the child finds failure in school a way of avoiding growing up (Kunst, 1959). In spite of arguments, about causality, however, all experts agree that whatever the cause, the child does not read as well as his peers.

There are as many programs developed to ameliorate reading problems as reasons given for failure to learn to read. Specialists from a wide variety of reading philosophies develop and field test new materials designed to "cure" the slow readers' ills. The publishers of these materials, however, usually do not continue to field test programs after they have been published. All too often teachers must, as they discover badly programmed areas in a series, develop their own remedial tactics.

Reading remediation is a multi-step process. It is not sufficient for the teacher to select a remediation procedure and/or a set of published materials recommended by an expert. The teacher must first assess which part of the reading process is deficient and ascertain which skills the child does and does not have. Once these skills have been carefully pinpointed, the child should be placed in appropriate

materials for instruction and a remediation procedure selected. Effects of this remediation procedure must then be continuously evaluated and changed if adequate progress is not made. By following these steps the teacher can bring the child closer to the final goal of reading instruction: the production of a person who can efficiently gain meaning from the written word.

The Need for Research

Educators who work with remedial readers have, over the years, developed a large repertoire of games, drills and teaching tactics which they utilize to aid the child. Many methods and tactics are really "superstitious" behavior on the part of the teacher. They may be recommended by experts, suggested in remedial texts or lauded by the teacher in the adjoining classroom, but their use has rarely been supported by classroom research. Large amounts of time and money are invested in evaluating one "method" as opposed to another, but some of the basic tactics in remedial teaching are not carefully investigated. Efforts to develop appropriate material and procedures for the child with reading difficulties should "...be advantageously combined with carefully designed research studies. Classroom procedures can be evaluated more critically and research conducted in meaningful settings on problems important to teachers." (Russell and Fea, 1963, p. 866).

Applied Behavior Analysis techniques have provided researchers with procedures which have allowed for the definition and exploration of discrete aspects of reading which have not previously been adequately researched in classroom settings. This research methodology has been developed to explore increasingly more complex academic tasks during the last fifteen years.

Arthur Staats and his associates published seminal reading research using behavior analysis. (Staats & Staats, 1962; Staats, Minka, Finley, Wolf & Brooks, 1964; Raygor, Mark & Warren, 1966). While his peers were exploring the use of behavior modification to decelerate disruptive behaviors, Staats was investigating the relationship between reading behaviors and contingencies of reinforcement in laboratory settings.

Not all research using behavior analysis techniques to investigate the operant control of reading was confined to the laboratory. Tokens, chips, points and trading stamps as reinforcers were demonstrated to have positive effects on reading performance by a variety of researchers in the field (Wolf, Giles & Hall, 1966; Haring & Hauck, 1969; Lovitt, Eaton, Kirkwood & Pelander, 1971). These researchers used the reading process to demonstrate that 1) applied behavior analysis techniques were appropriate to research a complex academic skill and 2) learning principles which govern non-academic behaviors could be applied successfully to academic tasks.

Behavior analysts then began to delve more deeply into investigating procedures to teach reading to children. Lovitt and his associates investigated the effects of phonics drills, previewing, phrase drills and error-word drills on oral reading proficiency (Lovitt,

Schaaf & Sayre, 1970; Lovitt & Hurlbut, 1972; Eaton, 1972). These studies indicated that behavior analysis was a functional method of assessing effects of many different environmental events including contingencies of reinforcement and teaching routines on simple reading behaviors.

The Program Project, drawing on this research, began to investigate the effects of other widely used classroom procedures and to assess more complex reading skills such as comprehension using the applied behavior analysis paradigm. In all of these studies, improved performance was measured not only through standardized tests, but also through some frequent measure of the subject area in which improvement was desired.

Standard educational research is group relevant. The data are reported in terms of a measure of central tendency and the scores of one group of subjects are compared with those of another group. A teacher, when studying these scores, is given no indication how any one student is performing under the experimental condition. She knows only how an average child is functioning. Data derived by means of behavior analysis methods, however, give the teacher and researcher individual data so that definite statements can be made about how each student performs under different conditions. This information can then be used to evaluate different reading "approaches" and teaching tactics.

This chapter will provide teachers with procedures developed through Program Project for the initial assessment of reading difficulties; placement in appropriate instructional materials; suggestions for instructional tactics; and methods for the evaluation of reading progress. The intent of this chapter is to provide the classroom teacher with effective research based tactics for teaching reading rather than to advocate specific published material. These instructional programs may be combined with any materials or reading series teachers have at their disposal.

ASSESSMENT

People often assume that assessment implies placement. In fact, these are two separate but compatible processes. In assessment a few samples of behavior are obtained over a wide variety of skills to suggest general areas of mastery and deficit in pupil performance. Placement involves detailed analysis of a student's performance within specific skill areas. For example, an assessment might indicate that Steve has difficulty recognizing and naming multiple sounds, while data derived from placement would determine exactly which multiple sounds were troublesome. The information derived from assessment then is used to decide what types of placement data are needed to plan instructional programs.

Screening with an instrument such as the Academic and Social Behavior Assessment Kit (ASBAK) isolates general clusters of skills which are most troublesome for each student. The ASBAK provides an initial

screening of three types of reading behaviors: pre-reading, beginning reading and reading in context. The reading tasks include saying the letters of the alphabet, recognizing and naming letters sequentially and in random order, recognizing and naming consonants, vowel sounds, and multiple sounds (blends, digraphs and diphthongs) in isolation; and reading and comprehending in context.

Some students will be unable to perform basic ASBAK skills of saying letter names and sounds. Subsequent placement should then determine which tasks the student can perform. Some students may be able to blend simple CVC words, others will be able to recognize the letters of their names, while still other students may only be able to visually discriminate between letter forms.

The ASBAK will also identify those students who have mastered most of the basic phonemic skills but have difficulty reading and understanding in context. The next step in placement for these students is to determine each student's instructional reading level, his word attack strategies and his ability to comprehend material of different levels of difficulty. The use of the ASBAK will be illustrated by the following case study.

Vance was 8 years old at the time of his referral to the Experimental Education Unit (EEU). He had not learned to read after three years of school, although psychological testing by the district had shown him to be of average intelligence. A staff member from the EEU visited Vance in his classroom for three days to gather ASBAK information. Each day, Vance was given the ASBAK battery of 19 tasks; 6 pertaining to reading. Two other children from Vance's class were chosen by the teacher to receive the ASBAK inventory. These children represented the extremes (high and low) of acceptable academic behavior in Vance's classroom. (The administration of the ASBAK has been described in Chapter 4).

The results of the reading portion of the ASBAK for Vance and his two peers are shown in Table 1. The three students performed similarly on four reading tasks: say letters in sequence, say letters sequentially and in random order given a visual cue, and say single consonants and vowels given a visual cue. Vance's performance ranged from 94 to 100% correct on these tasks. Vance and the low performing peer were inaccurate in recognizing and naming blends, digraphs and diphthongs in isolation. Vance and the low performing peer had considerably greater difficulty in both fluency and accuracy when reading in context than the high performing peer.

Insert Table 1 about here

Vance had mastered most pre-reading and beginning reading skills. He experienced difficulty on multiple sounds and in reading in context. These data confirmed the teacher's contention that Vance was in need of

special help in reading. It should be noted that Vance's performance was almost identical to his low performing peer. Subsequently, both students were accepted at the EEU. Placement inventories were then used to plan instructional reading programs. Placement inventories isolate which multiple sounds (blends, digraphs and diphthongs) are deficient; assess each student's word attack skills; and determine his or her instructional reading levels.

PLACEMENT

For some teachers, placement in materials presents little or no difficulty. The child is merely placed in the beginning of a reader appropriate for his age and grade level. If the child is in third grade, he is given a third grade reader. Unfortunately, age and ability are often unrelated.

Another method of placement uses scores obtained on reading achievement tests. According to this procedure, if a child scores at the 3.2 level on an achievement test, he will begin reading in a third grade reader. Achievement test scores are often indirectly related to the performance of pupils in classrooms (Eaton & Lovitt, 1972). For example, a pupil might be expected to respond to one type of item on an achievement test, e.g., circle synonyms, but is required to do something quite different in the classroom, e.g., read orally. Neither method of reading placement provides diagnostic information pertaining to a pupil's specific strengths and deficits in reading.

Placement in reading is intended to gain information from which a remedial program will be designed. Results of a placement profile are used to plan a pupil's program for the remainder of the school year. The profile should be of sufficient detail to permit specific diagnosis of each pupil's strengths and weaknesses. Obviously this information will not be obtained in a single class period. Economy of time should not take precedence over accuracy of information.

Methods for Placement

In general, there appear to be two ways to obtain diagnostic information of a student's reading abilities. One method is to diagnose specific skills using a battery of tasks containing different kinds of sounds, blends, or words. The student reads or says sounds on one page at a time for one minute while the teacher records the correct and incorrect sounds pronounced. Subskills such as auditory and visual discrimination may be assessed in this manner. This type of battery may be a feasible method for placing children with minimal reading abilities into reading programs and can provide teachers with very precise information of basic phonemic abilities. Sounds and words are not presented in meaningful contexts, however, so students are unable to use language

expectancies for decoding. Children's reading performance is far more accurate when reading in context than when reading words or sounds in isolation (Goodman, 1965).

A second method of obtaining diagnostic information is to record a child's errors as he reads selections of graduated difficulty. Through diagnosing reading in context the child can use his language expectancies. This method of placement provides teachers with four types of information. First, it provides an indication of each pupil's instructional reading level. Second, the pupil's specific strengths and deficits in word decoding are obtained. Third, the teacher gains information on each student's use of word attack strategies. Finally, each student's ability to answer different kinds of comprehension questions is assessed. These four types of information are analyzed and used to implement individualized reading programs.

If a child performs poorly in primer and first readers, diagnosis of specific skills is necessary to place him in appropriate instructional material. For example, twelve year old Scott's ability to read in context was minimal. In first grade Ginn 360 and Bank Street readers his average correct wpm was 22.5 and average incorrect wpm was 8.5. Subsequent diagnosis for Scott consisted of letter sounds and simple CVC word sheets.

Vance, however, was able to orally read Lippincott Book D (a 12 reader) at an average of 43.2 correct wpm with 4.7 incorrect wpm and 89% comprehension. A placement method consisting of reading in context was possible for Vance. Specific suggestions for obtaining information using each of these placement methods will be described in the following sections.

Diagnosing Specific Skills

Sequences of reading behaviors and flow sheets listing reading readiness, pre-reading and beginning reading skills are found in general reading textbooks and many teachers' manuals. These sequences include phonetic skills necessary to decode words. Some are arranged to teach word families, e.g., am, ram, Sam. Others introduce short vowels together, e.g., an, in, on. The tasks suggested by these lists may be used to design teacher-made skill sheets.

The sequence of readiness and beginning reading skills developed for use at the EEU (Haisch, 1973), is divided into 6 major areas: sequencing left to right, auditory memory, visual memory, using oral context, visual discrimination and auditory discrimination (see Table 2). Each of these clusters of skills is divided into component behaviors.

Insert Table 2 about here

Sequencing skills are prerequisite reading behaviors. They can be assessed casually during story-reading time. The ability of a child to repeat spoken letters, words, and phrases is called auditory memory. In visual memory tasks, the child is required to recall visual symbols by pointing to or circling correct "matches" after a cue has been removed. The term "oral context" is reserved for tasks in which the child uses his language expectancies to supply missing words in sentences. For example, the child's ability to supply a verb in the sentence, "The boy _____ over the log," is assessed. Visual discrimination tasks include choosing the same letter from among a group, such as choosing "b" from "b, d, p, q." The final skill included in this hierarchy is auditory discrimination of phonemes. This cluster of skills may be used to assess the specific phonetic behaviors used in decoding words.

Once the teacher has derived information from the ASBAK about possible deficit skill areas, she should select skill clusters for placement from a reading sequence. Neither the skills or sequence in which they are introduced are mandatory.

Multiple samples of behavior are obtained on each skill the teacher has chosen for diagnosis. The teacher can determine from these data whether the child is unable to perform the skill or whether daily practice is sufficient to improve performance. Instruction should be given on those skills the child is unable to perform, while reinforcement is used to increase fluency and accuracy of poorly developed skills.

Isolate reading behaviors should be measured in a variety of situations. For example, a child may perform differently when asked to read vowel digraphs in isolation ("ai"), in nonsense words ("balm"), in meaningful words ("rain") and in context, ("Don't rain on my parade."). Different teaching strategies would be used for children who perform poorly on skills only when presented in isolation and those whose performance is inferior only when tested in context.

Once these tool skills have been assessed, the teacher may begin instruction. It should be remembered, however, that assessment is an ongoing process. Periodically throughout the year, each child's performance on the cluster skills and his ability to read in context should be re-assessed to permit rapid movement through materials. Whenever possible reading instruction should be provided in meaningful contexts.

Diagnosing in Context

When to use a placement inventory. A reading placement inventory is appropriate when a student can read and understand short passages. This inventory combines some aspects of the Informal Reading Inventory (direct measurement across many levels) with the techniques developed by applied behavior analysts (direct and frequent measurement). Using this approach oral reading and comprehension are measured for several days from several levels of the reading series ultimately used for instruction.

Many different kinds of information may be obtained from the reading placement inventory. First, the inventory provides a profile of a child's ability to read and comprehend in a variety of reading materials at many levels. This information is used to choose a reading book for instruction.

Second, the student's reading errors on the placement inventory can be analyzed to determine the specific types of words he reads incorrectly, the kind of errors he commits (e.g., mispronunciation, omission, etc), and the potential 'meaning change' that these errors may cause in subsequent comprehension.

The term 'meaning change' needs further clarification. Goodman, (1965) introduced the concept of 'meaning change' to denote qualitative differences between words read incorrectly. Some reading errors, such as reading 'pony' for 'horse', or 'a' for 'the' produce no change in the meaning of a passage. Other incorrectly read words such as reading 'horse' for 'house' can change the entire meaning of the sentence. Therefore, a child who makes a lot of 'little' errors, i.e., non-meaning change errors, would require different instructional procedures than a child who makes many meaning change errors.

A third use of the placement inventory is to measure a child's ability to answer different kinds of comprehension questions. Four aspects of comprehension are assessed: recall, sequence, interpretation and vocabulary. An analysis of the child's ability to answer these types of questions either orally or in writing enables the teacher to plan activities to improve specific areas of comprehension.

Finally, the information obtained from the placement inventory may indicate to the teacher whether diagnosis of specific deficits are necessary or whether the student should receive further assessment in a different reading series. Students who are unable to be placed in readers for instruction using this method receive further diagnosis of specific tool skill deficits. Similarly, a student's reading performance may differ in series emphasizing a sight word approach as compared to series emphasizing phonetic-linguistic strategies. In any case, the goal of placement is to place a child in the highest reader possible - a level where he or she is motivated but not frustrated.

How the inventory was developed. This placement inventory is based on procedures for establishing instructional reading levels by Lovitt & Hansen (1975). Each student should complete the inventory in five to ten minutes per day over a period of three to five days.

The reading placement inventory was originally developed and used with seven intermediate aged boys referred to the EEU for academic remediation. The students were of average intelligence but were reading from 1-3 years below grade level according to their previous teachers. Five samples of reading and comprehension for each student were obtained in each Lippincott Reader (McCracken & Walcutt, 1970) from grades 1 through 6. Three reading behaviors were measured: correct oral reading rate, incorrect oral reading rate, and correct comprehension percentage.

Each student was placed for instruction in the highest reader in which his average performance was 45-60 correct wpm, 4-8 incorrect wpm and 50-75% correct comprehension.

Two major findings resulted from this study. First, although oral reading rates and comprehension scores generally worsened as the grade level of the material increased, the performance differences between adjacent books were minimal. Correct rate was more sensitive than either incorrect rate or comprehension percentage to changes in grade level. Second, after placement in the readers, all the students progressed satisfactorily throughout the remainder of the year. This procedure appeared to accurately place children in readers for instruction but it was quite time consuming. Placement took about one-half hour per day for each student over a period of two weeks. The data were re-analyzed to determine whether fewer samples per book and fewer numbers of books could be included without a loss in the predictive power of the reading placement inventory.

First, data were compared for 1, 3, 4, and 5 samples per book for each student. This analysis revealed that one reading sample per book produced a highly discrepant measure of a student's average performance while the average of 3, 4, or 5 reading and comprehension samples per book produced similar results. A minimum of three reading samples per book appeared to be sufficient to predict each student's average reading performance at each level of difficulty.

Second, a method of choosing which books to sample was developed. In the original study correct oral reading wpm was more sensitive to changes in difficulty level of readers than either incorrect words read per minute or percent correct comprehension scores. Further, in over 50% of the instances, the differences between correct rate means of adjacent reading levels was less than five correct wpm. These two findings were used to predict the probable instructional reading level of a student based upon his average correct wpm in his grade level reader. Each student's average correct wpm at grade level (rounded to the nearest 5 wpm) was used as a starting point. Five words per minute were added to this score for each lower book in the series until a score of 50 wpm was reached. This reader was predicted to be the student's instructional reading level. For example, if a student reads an average of 40 correct wpm in a 4th grade book, his predicted reading rate in a 3rd reader was 45 correct wpm, and 50 correct wpm in a 3rd reader. The 3rd reader was his predicted instructional reading level. If the student's actual performance in this reader met the criteria of 45 to 60 correct wpm, 4 to 8 incorrect wpm and 50-75% correct comprehension, then he would be placed in this reader for instruction.

When this method of prediction was used for 14 students at the EEU, 11 (78%) had actually been placed in the same reader as predicted. This prediction method underestimated the instructional reading level for three students, placing them one or two books too low. Readers of two or three different levels rather than all books at all grade levels may be used to predict the student's instructional reader. Once the predicted level has been determined, confirming reading samples in that reader should be obtained to insure accurate placement.

How to use the placement inventory. Implementation of the reading placement inventory consists of six steps. First, a reading series for placement as well as instruction must be chosen. Any reading series of books which are graduated in difficulty may be used. Basal readers are generally preferred for instructional reading rather than trade books or library books.

Once a series has been chosen, three 100 word samples of text are excerpted, one each from the beginning, middle, and end of each reader. These sections may be typed to simplify a record keeping of each student's reading errors.

The third step is to compose comprehension questions for each reading sample. The questions may be pre-written for all readers or for only the specific books the teacher plans to use. The mode of response (oral or silent) should be the same for both placement and instruction. In first through third grade readers, six questions per 100 words are written: 2 recall, 2 sequence and 2 interpretation. Books above third grade level require four questions per 100 words: 1 recall, 1 sequence, 1 interpretation and 1 vocabulary.

Recall questions deal with facts given in the story; for example, "Where did Danny Morgan live?" Sequence questions pertain to the temporal ordering of events such as, "What did Danny want to do after he and his father rode to Lookout Point?" Interpretation questions include synthesis, inference, translation and application processes: for example, "Why didn't Brick Morgan like the Indians?" For the vocabulary aspect of comprehension, a sentence containing a difficult or unusual word is selected from the 100 word passage and the vocabulary word is underlined. The student is asked to select a synonym for that word from a choice of four other words. One word is an appropriate synonym, another word means the opposite, one is a near synonym and the last is chosen at random but is the same part of speech.

Wording of the comprehension questions should be of similar difficulty as the story. The questions should not overlap; each question should be about a different aspect of the story.

The fourth step in the reading placement process is collection. Each student is tested individually and is told he will be asked to read orally and answer questions from different books to determine which reading level is best suited for him. He is asked to try his best as he reads the various selections and not to worry if some passages are difficult.

The student should begin reading the three selections from the reader appropriate for his chronological age and grade level. The student may read the questions for one selection per day. A stopwatch or watch with a second hand sweep is used to time the student as he reads the 100 words. The watch is started as soon as the student begins to read and stopped when he has read the last word of the segment. During the oral reading session each incorrectly read word is tallied or recorded on a duplicate story. All mis-read words are immediately corrected by the teacher and the student is encouraged to continue reading.

Incorrectly read words include omissions, substitutions, insertions, mispronunciations, hesitations longer than four seconds and "I don't know's". Proper names and places, repetitions, and self-corrections are not counted as incorrect responses. A suggested method for marking reading errors is as follows.

Omission	Circle word omitted
Insertion	Write the word above the line where insertion occurred
Mispronunciation or Substitution	Write the observed word above the correct word
Hesitation of +4 seconds	Write "H" above word
Don't Know	Write "DK" above word

Comprehension is checked after each 100-word segment is read. The student is handed the pertinent set of questions and asked to read them silently and write his answers. The questions may be administered orally if subsequent reading instruction will use this mode. The student is allowed to ask for assistance in reading the questions. The comprehension questions are later corrected and returned to the student.

After all three segments of the student's reading performance at grade level have been completed three pieces of data are calculated: oral correct words per minute (wpm), oral incorrect wpm, and percentage of correctly answered comprehension questions. Oral correct wpm are obtained by subtracting the number of incorrectly read words from 300, dividing that score by the total number of seconds the student read and multiplying the result by 60. Incorrect wpm are obtained by dividing the total number of incorrectly read words by the number of seconds the student read and multiplying the result by 60. Percentage of correctly answered comprehension questions is obtained by dividing the number of correctly answered questions by the total. The resulting scores are the student's average reading rates and ability to comprehend in his grade level reader.

The appropriate placement level for instruction is the highest level reader in which a student's average correct rate is between 45-50 wpm, average incorrect rate between 4-8 wpm, and average comprehension score between 50-75%. Normally, a remedial student will not be expected to meet these criteria in his grade level reader. In order to predict a student's instructional reading level, his average correct rate at grade level (rounded to the nearest unit of 5) is calculated. This score is increased 5 wpm for each lower reader in the series until a score of 50 wpm is obtained. The book in which the student is predicted to read 50 correct wpm is his predicted instructional reader.

The sixth and usually final step in placement is to confirm the student's performance abilities in the predicted instructional reader. If the student's average performance in this reader meets the above criteria for placement, instruction will begin. If the student fails to meet these criteria, his performance in an adjacent reader is obtained.

Additional diagnostic information may be obtained by analyzing each student's reading performance to determine the type of errors most frequently committed. Specific remedial tactics may be designed to improve these weak areas. The student's ability to answer the different kinds of comprehension questions could also be analyzed. Our data indicate that students usually perform best on recall questions and least well on interpretation questions (Hansen & Lovitt, 1975). However, the teacher may decide to concentrate on building specific kinds of comprehension skills.

Marty's placement inventory. Marty was a third grade student and should have been reading in Book G. Using criteria for placement, he began instruction in Book D. Figure 1 shows his placement data. In the top graph are his mean oral correct and incorrect rates for the eight readers. In the bottom graph are his percentage scores for answering comprehension questions. The placement procedures could have been less time consuming for Marty and his teacher had the prediction method been employed. Using the correct wpm score from Book G, 50 wpm was predicted in Book D. Therefore, the predicted and actual placement levels were identical for Marty.

Figure 1 about here

Two ways to place students for instruction were discussed in this section. The first method was to diagnose each student's strengths and deficits on specific pre-reading and beginning reading tasks. This method is appropriate for placing students who are unable to read and comprehend stories. When students are able to read words in context, a reading placement inventory is advised. The placement inventory allows the teacher to choose a reader for each student which is challenging but not frustrating. The data from the reading placement inventory may be analyzed to diagnose students' specific strengths and weaknesses and to plan remediation procedures.

Although these procedures normally occur at the beginning of the school year, periodic reassessment is essential. The reassessment of each student's performance is used to determine when a new program is needed and as a method for evaluating progress.

STRATEGIES FOR TEACHING

Most teachers agree that no one teaching procedure is effective for all students. Some children thrive on word games when learning their phonics rules, while others fail. Some learn easily how to answer interpretive questions; others cannot even recall facts. These children may not have different learning "styles" or abilities. Instead they may

be functioning at different levels on the learning hierarchy. Differential teaching strategies appear to be appropriate for different levels of the learning hierarchy (discussed in detail in Chapter 2). The learning hierarchy provides guidelines for selecting remediation strategies based upon pupil performance. An instructional procedure which facilitates acquisition of early phonetic skills may be inappropriate for children who need practice in application of those skills.

Placement inventory data are used to determine students' performance level in the learning hierarchy. The use of the learning hierarchy in this manner facilitates matching a child to an instructional tactic. The student's assessment and placement data provide some of the information the teacher needs to choose appropriate instructional procedures.

Table 3 summarizes the different stages of the learning hierarchy in reading. It provides suggested teaching procedures for each level. The strategies are divided into five categories corresponding to the levels of the learning hierarchy. These strategies were selected from research studies conducted at the EEU. Some are commonly used in classrooms; others were developed specifically to meet the particular needs of our student.

Insert Table 3 about here

These strategies may be combined with any materials, programs, books, workbooks or series. Our data indicate the selection of a program is probably not as important as the selection of a teaching intervention. The remainder of this section will illustrate how these procedures might be implemented in the classroom.

Initial Acquisition -- Level 1

Children who perform at level one of the learning hierarchy are in the initial acquisition stage of reading. They lack the prerequisite skills to read in context. Their performance is characterized by a small sight word vocabulary; little understanding of grapheme-phoneme correspondences and phonics rules, laborious decoding and poor comprehension. Instructional strategies for these beginning readers should concentrate on those aspects of decoding which are deficient. A number of procedures will be suggested which have proven effective for children at the initial acquisition stage of reading. These strategies include phonics training, focusing attention on errors, error word drills and instruction in beginning comprehension skills.

Strategies to improve decoding

Phonics training. If the student does not understand grapheme-phoneme correspondences and is unable to utilize word attack skills in isolation, instruction should begin with phonics training. Many published materials are available to teach these skills. An applied behavior analysis approach to phonics training has been suggested by Lahey, Weller and Brown (1972). This approach includes use of component analysis and sequencing of different phonics skills. Dancey (1975) presented data to indicate that the sequential presentation of phonics is an efficient method to teach decoding. Lovitt and Hurlbut (1974) also using applied behavior analysis techniques, illustrated that systematic teaching of phonics skills ameliorates the pupil's ability to read orally in context, regardless of the orientation of the reading series.

The essential components to successful phonics training seem to be; a) a careful assessment of the skills the child does and does not have; b) sequencing skills in a desired order for instruction; c) a systematic method of instruction, such as drill, and d) a measurement system which allows assessment of the pupil's growth in using phonics skills in isolation, and also his transfer of these skills to reading in context.

To illustrate how these procedures might be used, the data from one child in the Lovitt & Hurlbut (1974) study will be presented.

Tom, a fourth grader, was labeled "dyslexic" according to the Slingerland reading test (1968). His reading level was 2 on the Spache Diagnostic Scales (1963).

Seven measures were obtained daily: five pertained to phonics skills and two were in oral reading. The five phonics components measured in isolation were medial vowels, consonant blends, sound blending, translocation of letters and digraph-diphthongs. The Lippincott 2² (McCracken & Walcutt, 1966) and Ginn 2² (Ousley & Russell, 1961) readers were used to obtain oral-reading measurements.

During both baseline and instruction conditions, the teachers measured Tom's performance on each phonics skill. After the five skills were tested, Tom read for five minutes each from the Lippincott and Ginn readers. As Tom read, the teacher noted his errors. If Tom mispronounced a word, he was not corrected. If he made no attempt to pronounce a word, he was told to skip it and continue reading. After the oral reading measures were obtained, the teacher returned the corrected phonics papers to Tom, indicating his error and correct answers. No feedback was provided for his oral reading.

In the second phase, Tom was given ten minutes of instruction on each phonics task before any measures were obtained. For example, instruction directed toward medial short vowels consisted of four steps: 1) the teacher pronounced a word such as fun and asked Tom to tell which letter made the /u/ sound; 2) Tom was then asked to state the key word he had been taught to identify with the short u sound, umbrella; 3) Tom then said the letter, the key word, and the letter sound (u, umbrella,

/u/); 4) Tom also "wrote" the u in the air, while he verbalized this chain. Similar training was given for the other phonics elements. No specific teaching was directed toward oral reading from either reader. All other procedures remained as they had been in the baseline condition.

Figures 2 & 3 illustrate Tom's performance in two of the five phonics tasks and oral reading samples. The mean correct rates for every behavior increased, mean error rate decreased and correct percentage increased from first to second conditions when data from the seven measures were compared. Systematic phonics instruction does affect a pupil's performance on phonics tasks. This study also provided evidence that when these skills are developed, oral-reading performance in basal readers improves.

Insert Figures 2 & 3 about here

Tom's baseline data indicated that he had not yet acquired the basic phonic skills in isolation. Therefore, direct instruction on these skills was appropriate. Instruction on each specific phonic skill is not advisable or appropriate for children who have acquired skills in isolation but are not applying them in context. These students would benefit more from strategies which emphasize transfer of phonics skills than specific instruction on each skill.

Focusing. Reversing b's and d's are common difficulties of children labeled "dyslexic" or reading disabled." These children have usually mastered the basic phonetic skills but become easily confused with certain letters and words. Teachers often get a gleam in their eyes when they hear a child reverse a "b" or "d". Phrases such as "He's perceptually disoriented"; "She must have mixed dominance, or "His neurological organization is poor,"; are commonly heard. Unfortunately, this reasoning may be used as an excuse for not remediating the difficulty. In some cases, the child may not be "pressured" to distinguish between b's and d's because extra emphasis on this difficulty might result in more errors. Teachers of other children may spend many hours devising expensive remediation schemes, including kits, games or entire academic programs. The consumer is often asked to accept these "cure-alls" at face value without adequate research.

We have found that in many cases "perceptual" difficulties can be remediated using very simple interventions. One such tactic, focusing, was applied to the problem of reversals by Jacobi and Eaton (1975). This experiment was a replication of a study of reversals in spelling by Smith and Lovitt (1973).

Jeri, a fourteen year old learning disabled girl, was cooperative and hardworking, but often reversed b's and d's when reading words in context and on word lists. For three days, baseline data were obtained

on Jeri's ability to read lists of CVC words which contained a "b" or "d" in the initial or final position. During baseline, Jeri scored an average 69% correct recognition of these letters. Her performance was most accurate (82%) on words containing initial d's and least accurate (65%) on words containing initial and final b's.

During the intervention phase, Jeri's teacher focused Jeri's attention on b-d reversals before reading the sheet of CVC words. The teacher wrote the word "bam" on a sheet of paper and told Jeri that sometimes she said "dam" when reading "bam." She was asked to pay careful attention to her b's and d's.

Within two days Jeri scored 100% on all b's and d's. When this simple instructional procedure was discontinued, Jeri continued to score 100%. In addition, Jeri no longer made reversal errors when subsequent measures of her abilities to read in context were obtained. These data indicate that a simple tactic which focuses a student's attention on b's and d's may be as effective in some cases as exhaustive techniques often suggested for remediating reversals in reading.

Word drill. Some children have a good grasp of decoding skills when presented in isolation, yet they do not appear to apply these skills when reading in context. One such student was eight year old Diane. Her records indicated that she was a primer reader. The teacher asked Diane to read the first page of SRA Book A, a pre-primer which said, "Dan can fan the man." Diane looked at the page and responded "See the lovely green tree on the hill." Diane was responding to the picture on the page rather than reading the story.

Children, such as Diane, who have poor decoding skills in context, stumble hesitantly through passages. They are characterized by high error rates, excessive guessing and minimal sight vocabularies. Word drill is often recommended by remedial reading specialists to enhance word recognition in such students (Buswell, 1947; Lloyd, 1969; Mason, 1968).

Teachers present word drill to their students in different ways: flashcards, word lists and language master. Drill sessions may be in group settings, one-to-one situations with a teacher or peer, or the child may drill himself. Finally, students can drill on new words or words with which they have particular difficulty.

Unfortunately, little research is available to support claims that drill with word cards facilitates reading. The bulk of the studies dealt with the introduction of new words to the child's sight vocabulary (Staats, Staats & Schutz, 1962; Duquette, (1970). The use of corrective drill on error words has seldom been researched, although it is a tactic often used by remedial teachers.

A study was conducted to evaluate the effects of drill of new words and drill of error words on the oral reading performance of six primary aged pupils (Eaton & Haisch, 1974). The subjects of this study were from 6 to 8 years of age and were all at least one year below grade

level in reading. Each pupil was placed in either a Chandler (1970) or Ginn (1966) reader appropriate to his performance level. The performance level was determined by taking placement data in the manner described earlier in this chapter.

Three basic conditions were used with each pupil; no drill or baseline, drill on new words, and drill on error words. The sequence of presentation of these conditions was not the same for each child. Three children drilled first on new words, while the other three drilled first on error words. All children received each intervention at least two times during the study.

The two basal readers were divided into story sections containing five to eight new words. New words were selected from the list of words which were "new" to the series according to the publisher. When a child was assigned a section, he re-read the assigned passage daily until his performance was at a specified desired reading rate. He then progressed to a new section and returned to baseline conditions. Desired correct rates ranged from 80-100 wpm and the desired error rates were 3 wpm. (Desired rates are rates determined by the teacher to be a measure of proficiency. If a child can read a story accurately, but only at a rate of 20 words per minute, he cannot be considered proficient. Therefore, the desired rate criterion includes both a correct rate and error rate specification - see Chapter 6).

Baseline data in each section were collected for seven days. Drill conditions were in effect until desired rate was met or a maximum of three weeks had elapsed. At the end of three weeks a new section was assigned whether or not the desired rates were met.

During the no drill condition (Condition A) the children did not drill on any words before reading. Each child was given 5 minutes to practice the specified pages. After this practice period a one-minute oral reading sample was taken from a different starting point in the story each day. No feedback was given on errors. The teacher merely counted the correct and error words read and recorded the scores.

In the drill on new word condition (Condition B), the teacher contacted the pupil before the practice session and presented five language master cards with five new words from the section assigned in the book. The pupil was told to use the language master to drill on the words for three minutes by listening to each card and recording the words. At the end of the three minutes the teacher contacted the pupil, and asked him to read the words. The pupil returned to his desk and the reading session continued as in Condition A. Each day this procedure was repeated.

Procedures during the error word drill condition (Condition C) were identical except that the five words on language master cards were randomly selected from words the pupil had read incorrectly in his previous day's oral reading sample.

Table 4 presents the mean median correct and error scores and percent correct scores for each child. Mean scores were obtained by

averaging the medians of all similar conditions. For example, all baseline conditions were combined and are represented by a single score. Four of the six students obtained their best correct and error mean medians when drilling on error words. The scores for fifth pupil, Michael, were identical under both drill conditions; under the error drill conditions, however, the movement of the data were in desirable directions. In other words, during drill new word conditions, the correct rate was falling and the error rate rising (certainly undesirable from a teacher's point of view). During drill error word conditions, the correct rate was accelerating and the error rate decelerating. The group mean median scores indicate that in general, error word drill produced the best results with a mean median correct of 57.5 wpm and a mean median error score of 3.8 wpm.

Insert Table 4 about here

Figure 4 shows a graphic representation of one child's day-by-day progress in reading. Stephanie's error rate was considerably higher during the initial baseline phase than her correct rate, with a median of 43.0 error words per minute. In fact the words that Stephanie read correctly in each reading were usually due to her close attention to picture cues.

Insert Figure 4 about here

Stephanie's reading improved when she drilled on new words (Condition B1). Her performance changed from 7.0 correct wpm to 30.0 correct wpm. Stephanie's error rate also showed improvement, dropping from the previous median of 43.0 wpm to 6.0 wpm. A second baseline phase was then scheduled followed by a program of drill on error words.

Error word drill (Condition C1) was even more successful with Stephanie than new word drill. Her error rate dropped dramatically, reaching zero near the end of the phase. When baseline conditions were reinstated (Condition A3), the errors increased, but did not rise above the correct rate as in the previous baseline phase. Stephanie continued to improve in both correct and error rate throughout subsequent phases. She performed best under the error word drill conditions.

Word drill appears to be an effective intervention tactic to improve oral reading performance. These data support the recommendations of Dolch (1947) and Mason (1963) and the findings of Staats, Staats, and Schutz (1962). Other research (Spacil, 1975; Liberty, 1975) conducted through the Program Project also supported the use of drill on unknown words. In addition, Spacil found that routine drill produced better

results than word games or novel drills during initial acquisition of reading skills.

Error word drill is generally superior to new word drill. New word drill is, however, better than no drill. Error word drill may be superior to new word drill because it focuses on specific words the child cannot decode rather than emphasizing new words listed in the back of the book which may or may not be new to the child's reading vocabulary.

Three methods for improving decoding skills during initial acquisition have been suggested; phonics training, focusing, and error word drill. Each of these strategies appears to be most effective when matched with pupil performance. Children with little or no phonics abilities should be provided with training in those skills. Focusing will probably benefit children with a good grasp of basic decoding skills but who consistently err on specific symbols or words. Finally, error word drill is intended for children who have mastered decoding skills in isolation but do not apply them consistently in context.

While decoding is of primary importance during the initial acquisition stage, comprehension should not be neglected. Reading is a process intended to derive meaning from the printed word. Attention to the development of comprehension skills during initial acquisition may facilitate this goal.

Strategies for improving comprehension

Children in the initial reading acquisition stage, often appear to have limited comprehension. An inability to comprehend may be due to poor decoding skills or generalized deficits in communication. Some children, although they "cannot understand what they read," are able to comprehend; they can follow spoken directions; they can share needs and ideas with others and remember and discuss stories they have heard. Difficulties in comprehension arise only in context of reading. Often, as decoding skills improve, simultaneous improvement in comprehension is observed.

Better comprehending through better reading. Matt, a nine year old boy, had minimal decoding and comprehension abilities. His comprehension performance in first and second grade readers was 33.3% to 44.4% (See Figure 5). His decoding skills in these books were from 13.8 - 25.2 correct wpm and 3.1 - 6.7 incorrect wpm. For six months, Matt was provided an intensive program of building word attack skills using SRA preprimers and Systematic Reading Instruction (Duffy & Sherman, 1972). Matt's only practice in comprehension during this period was to retell the events of each story.

Insert Figure 5 about here

The placement inventory was readministered after this period. The results of the inventory indicated that Matt was still not a proficient reader, but decoding abilities and his fluency in first and second grade readers had improved. His correct rates now ranged from 30.5 to 46.8 wpm with an error rate range of 2.0 to 4.0 wpm. The most dramatic change, however, was in Matt's ability to comprehend. His comprehension performance ranged between 88.9% to 94.4%. Matt had improved over 50% in his ability to comprehend. Therefore, an increase in Matt's ability to decode and use the tool skills of reading, helped his ability to comprehend. Expensive, exhaustive interventions to improve Matt's comprehension in reading were unnecessary.

Teaching comprehension skills. Other children become good "word callers" and display an excellent ability to decode, but still do not comprehend what they read. These children are often characterized by a general inability to easily comprehend written or spoken language. The following case study (Hauck, Metcalfe, & Bennett, 1975) illustrates a procedure which was effective with such a child.

Ten year old Todd was a fluent reader. His mean reading rates in Ginn 360, Level 7 were 91.4 correct wpm and 4.0 incorrect wpm. Todd could decode easily but was unable to answer comprehension questions about his assignment. This difficulty in comprehension may have resulted from poor verbal communication skills.

Initially a reading program was designed for Todd to provide practice in verbal communication by answering questions orally. Each day Todd read a story from his reader. His teacher then selected one page for Todd to re-read and asked five to ten oral comprehension questions based on this page. These questions included: recall, inference, sequence and main ideas. Todd's daily performance on the comprehension task is shown in Figure 6. His mean comprehension score was 60.5% during this phase. Todd had equal difficulty with all types of comprehension questions, erring as often on the easier recall questions as on the more difficult inference variety. Todd was unable to answer questions unless he could restate the text verbatim and could only perform at 80-100% when the teachers helped him find the appropriate response.

Insert Figure 6 about here

To help Todd increase his ability to comprehend, his teachers carefully identified and sequenced pre-comprehension and comprehension skills. Comprehension skills were introduced in clusters in the following order: what, who, where, when, locating the answer on the page, sequence, retell, main idea and inference (how and why). Each cluster skill was then further divided or sliced into component processes. Table 5 illustrates how the first comprehension skill, answering "what" questions, was sliced. This table also suggests a sequence of procedures which could be used to teach each component of the skill.

Insert Table 5 about here

During the subsequent conditions, Todd was able to progress through the sequence at the cluster level. The reading program was the same as described above except that Todd was only asked "what" questions. His comprehension performance averaged 85.3% correct. In the third conditions, Todd's performance continued stable, therefore, "where" questions were included next. Careful sequencing of skills did improve Todd's comprehension (See Figure 5). Todd was able to answer the questions by paraphrasing what he had read rather than relying on verbatim responses. His mean comprehension score was now 83.9%, more than 20 percentage points higher than in the first phase of the reading program.

Both Todd and Matt were initially unable to derive meaning from the written word. Matt was unable to comprehend because he lacked sufficient decoding skills to read. On the other hand, Todd was a good "word caller," and could "read" language structures more complicated than those he used spontaneously in his classroom interactions. Yet Todd was not able to comprehend what he read. Adequate comprehension was achieved when Todd learned how to respond to very specific types of questions. These two children illustrate a few of the complexities in teaching comprehension skills. When students have mastered basic decoding and comprehension skills they are ready to move into the advanced acquisition stage of the learning hierarchy.

Advanced Acquisition - Level 2

The advanced acquisition period in reading seems to be characterized by an ability to decode fairly accurately but slowly in context. There are two stages in advanced acquisition. Different instructional procedures appear to be appropriate at each stage. In the first stage, when a student can read between 20 - 45 correct wpm, the emphasis is on rapid decoding in context. When students have become more skilled at decoding (45 - 80 correct wpm) the emphasis is placed on moving them rapidly to grade level.

Advanced Acquisition - Stage 1

Corrective feedback and previewing are two procedures which have proven successful in building reading fluency. Both procedures are often found in classrooms, but are rarely used systematically or efficiently.

Corrective feedback. Children who are proficient in oral reading use multiple strategies for decoding unfamiliar words. If one strategy does not produce a meaningful word, skilled readers try alternate decoding strategies until they obtain satisfactory results. Children who

find reading difficult may lack alternative word attack strategies. If the one "tried and true" method fails, the child gives up and either requests help or ignores the troublesome word and tries to continue reading.

Hansen (1975) investigated whether children could be taught to use alternative word attack strategies through corrective feedback. Five learning disabled boys, ages 9 - 11, read orally to the teacher in an individual session for five minutes daily. Records were kept of the number of correct words read and types of errors committed on a data sheet (see Figure 7).

Insert Figure 7 about here

The data sheet also allowed the teacher to tally the strategy which was effective in helping a child decode each troublesome word. These eight strategies were arranged in a sequence which progressed from minimal teacher assistance to modeling of the correct phoneme or word (See Table 6).

Insert Table 6 about here

During baseline conditions, if the child did not self-correct his error within 3 - 5 seconds, the teacher gave him an aided oral cue (level 7). In the second condition, when the child erred, the teacher used corrective feedback by providing cues from the sequential list of word attack skills. For example, if a level 2 cue did not help the child pronounce the word correctly, a level 3 cue was provided and so on until finally, if all previous cues had failed, the teacher gave an aided oral cue (level 7).

The results of this study are illustrated in Table 7. Errors were self-corrected by the student 24.8% of the time during the first phase. Aided oral cues were required for 71.5% of the errors. During the second phase aided oral cues accounted for only 11.3% of the errors; while the percent of self-corrections had increased slightly to 29.7%. In addition, "try another way" proved successful 40% of the time in correcting errors. Four of the five children increased in reading accuracy during the corrective feedback phase; the group mean errors per day dropped from 18.39 to 12.9. The children were able to use the higher level word attack skills when requested. The increase in both self-corrections and in accuracy during the second phase accompanied by a 51.3% decrease in omission errors, may indicate that when alternative strategies were practiced in a formal situation, children were able to internalize and use them independently.

Insert Table 7 about here

The change in the kind of feedback the teacher gave to the student as he read appeared to be the crucial aspect of this study. When only aided oral cues were used, the child was not given the opportunity to learn or use alternative word attack strategies. When a sequence of strategies was provided, students read with greater accuracy and independence.

Previewing. An alternative procedure for building reading fluency is called previewing. The opportunity to preview a selection allows a child to practice his decoding skills independently and to become familiar with the story. The term previewing is applied to any method which enables a child to read or listen to a selection prior to instruction and/or testing. Three kinds of previewing are commonly used in classrooms: oral previewing, previewing by listening, and silent previewing. These three methods of previewing were compared with eight children 9-17 years of age by Eaton, Lovitt, Sayre & Lynch (1974).

The number of previewing tactics evaluated with each child varied. For some children a single tactic was used; for others, two or three different previewing tactics were alternatively employed.

The student read the assigned passage aloud to the teacher before the reading session during oral previewing. In some cases, feedback was provided on error words, in others, the child read without feedback. In the listening condition the teacher read the passage while the student followed along in his text. During the silent previewing condition, the pupil read the assigned story silently at his desk, before beginning his individual reading session. Each child was encouraged to request help with difficult words.

Instructional procedures for all children were the same. While reading, if a child mispronounced or hesitated at a word, he was told that word and asked to say it. No further instruction was provided.

Mean correct rate, error rate, percent word accuracy and percent change between baseline and each previewing condition are presented in Table 8. Analysis of these data revealed that all three kinds of previewing positively effected correct rate. The percent change between conditions ranged from 21.9 to 46.3%. Error rates for all students decreased with percent changes which ranged from 7.9% to 58.5%. Gains observed in reading fluency may have resulted from an increased familiarity with the story during previewing. However, increased fluency in reading did not maintain when the opportunity for silent previewing and listening was discontinued. Improvement in reading fluency as a result of oral previewing did not deteriorate when this procedure was discontinued.

Insert Table 8 about here

Word accuracy also improved during all previewing conditions. Oral previewing combined with feedback resulted in the greatest and most stable improvement in error rate for all subjects. In fact, the error rates continued to improve even when previewing was no longer in effect. In all other conditions a rise in error rate was observed after previewing was withdrawn. Greatest improvement in accuracy was seen during conditions in which pupils were given the opportunity to practice or listen to troublesome words. This change was more apparent during oral previewing combined with feedback than when the student passively listened to the story.

The importance of feedback is further supported when the data from silent previewing are analyzed. The error data reported for silent previewing reflect a reduction in error rate for only one pupil. This child was the only pupil to take advantage of the opportunity to ask for help on difficult words during the silent previewing session. Other children who did not request help during silent previewing, did improve in reading accuracy when previewing by listening or oral previewing with feedback were scheduled. Tactics which incorporated feedback ensured that children were given the opportunity to correctly preview each word. The resultant improvement in error rates support Askew's (1948) assertion that some children lack the ability to spot troublesome words on their own, but will perform better when given input on these words.

Previewing tactics have specific effects; some influence only correct rate, others influence both correct and error rate. Therefore, when a teacher chooses a previewing tactic for a child, she should pinpoint his area of greatest difficulty. If the child is fairly accurate, but deficient in fluency, then any previewing tactic should be useful. If, however, accuracy is a problem the teacher should select a previewing tactic, (such as oral previewing with feedback), that provides help with difficult words.

Previewing tactics are generally inexpensive in terms of teacher time. Silent previewing or previewing by listening to a tape can be used independently. A teacher's aide, or a good peer reader can listen to the child read orally and supply help with difficult words.

Previewing is not a panacea for all reading problems. Accurate records of each pupil's performance should be kept to evaluate any instructional tactic selected.

Advanced Acquisition - Stage 2

The teacher's primary goal for a student who reads instructionally one to three years below his appropriate grade level, is to develop adequate reading at grade level as expediently as possible. Providing practice in applying word attack skills and building confidence are two

additional goals. Instruction should occur through guided oral reading rather than completion of workbook assignments. Word attack skills learned in isolation must be applied in meaningful reading contexts to promote transfer and generalization. Comprehension skills beyond the literal level should be emphasized and further developed.

Moving to grade level - skipping. Children reading below grade level are distressingly aware of their inadequacies. If these children can be provided with a program in which rapid acceleration is not only possible but highly probable, they will gain self-confidence as they improve their reading performance. A child who is confident that he can learn to read will learn to read.

One method of achieving rapid movement through materials with concurrent improvement in performance is called "contingent skipping." Skipping is based on the rationale that it is not necessary to read every page of a book in order to become a proficient reader. Omitting stories and sections of readers is not a new practice. Spache & Spache (1969) advise this procedure for normal and above average readers. Below average readers, however, are automatically assigned every page and sometimes required to re-read books. This practice is usually justified on the grounds that remedial readers need more practice than other children in basic skills to become proficient readers.

How skipping was developed. Recent research (Lovitt & Hansen, 1975) indicates that students performing one to three years below grade level in reading can improve reading and comprehension while omitting entire sections of books. Three reading behaviors were measured: oral correct rates, incorrect rates, and correct percentage for answering comprehension questions. Throughout a baseline phase neither an instructional nor a reinforcement technique was scheduled. Contingent skipping and drilling were used during the second condition of the study. If a pupil's oral reading rates and comprehension score exceeded criterion levels, he was allowed to skip several stories in his assigned reader. If the pupil did not skip for several consecutive days, drilling procedures were arranged. These drills consisted of practicing error words, repeated reading to increase fluency and guided correction of comprehension questions. Following this intervention period baseline conditions were reinstated.

Every student's reading improved in correct rate and comprehension accuracy from first to second conditions. The incorrect rate performances of four students also improved. When skipping and drilling were no longer required, most students maintained their gains. Average rates and comprehension percentages were, in fact, better during this condition than in the second condition.

Although two additional studies were conducted, definitive statements as to the relative merits of the two procedures skipping and drilling, cannot be made since so few subjects were involved. However, the opportunity to skip, of itself, did appear to be reinforcing. Drill procedures were never used with some students; in fact, 70% of all skips occurred without the necessity of drilling.

These performance gains appeared to be stable and permanent. The students gained an average of 1.9 grade levels (range from 1.0 to 2.5) throughout the year. Further, skipping enabled all students to attain instructional reading at grade level within a short period of time (average 15.7 weeks).

How to use skipping in the classroom. Skipping has been subsequently adopted in many classrooms. Specific suggestions for implementing the skip program have been developed. Naturally, teachers will modify these procedures in accordance with their specific needs.

Prior to initiating the skip program, each book in a series is divided into four sections with equivalent numbers of stories. Each story may be pre-counted into 500 word segments to ease subsequent data collection and sets of comprehension questions prepared. Three questions for each 50 running words of text are written: 1 recall, 1 sequence and 1 interpretation (note: in readers above third grade level, the proportion of questions to text is four per 100 words: 1 recall, 1 sequence, 1 interpretation and 1 vocabulary). The questions are written similarly to the reading placement questions and require short, written responses. In the first- to third-grade readers, 500 words of a story and 30 comprehension questions (10 recall, 10 sequence and 10 interpretation) are assigned per day.

The general rules for implementing the reading skip program are as follows. Each student should be placed in an appropriate reader according to his performance on the reading placement inventory. Normally, the skip program is not appropriate for children reading at primer level or at grade level.

After placement is completed each student begins to read his assigned book for five to seven days (baseline). Before a pupil begins each section of a reader, he may be given an opportunity to skim through the section and decide the order in which he prefers to read the stories. Ordering by preference is used because if a student's preferred stories appear at the end of a section, the pupil might attempt to avoid skipping, or be disappointed if he did skip. In addition, the pupil is more likely to read better when allowed to read stories which he finds interesting.

Students read 500 words orally each day. The only exception to this rule is when the last segment of a story is less than 500 words. If this segment is more than 225 words, it constitutes an assignment, otherwise it is added to a 500-word segment.

Oral reading sessions are conducted individually. Two types of feedback are used. The first two minutes of the reading session are used for testing. In order to skip, the child must reach his criterion scores without teacher assistance. If, during these two minutes the child mispronounces or is unable to pronounce a word, the teacher merely supplies the correct word. Throughout the remainder of the session, corrective feedback and instruction are provided as described previously. Intermittent praise is given for fluent and accurate reading. The

student is then handed a sheet of comprehension questions to answer. He may ask for help in reading the questions, but may not refer to his reader to answer them. Answers to comprehension questions are later checked by the teacher and returned to the pupil.

Data are kept on oral correct and incorrect rates and percentage of correctly answered comprehension questions. To ease data collection and analysis of oral reading performance, only data from the first two minutes of reading are obtained. Correct and incorrect words per minute rates are obtained by dividing the number of correct or incorrect responses by two. In order to calculate the correct percentage for answering comprehension questions, the number of questions correctly answered is divided by the number assigned, and multiplied by 100.

The first five to seven days of instruction are the baseline phase. Baseline data are used to confirm placement, establish each child's average reading performance, and to determine criterion rates for skipping. No additional feedback, instruction, or reinforcement techniques are scheduled in baseline.

At the end of the baseline condition, improvement scores for skipping are calculated. Mean oral correct and incorrect rates and mean correct percentage scores for answering questions are calculated from the two minute daily samples for each student. Twenty-five percent improvement over baseline performance is required for skipping. To obtain these scores, multiply the mean baseline correct rate and percent comprehension scores by 1.25 and the mean error rate by .75. For example, if, during baseline, Fred's average correct rate was 60 wpm, incorrect rate was 6 wpm, and his average correct comprehension percentage was 70, the desired scores for those corresponding behaviors throughout the skipping phase would be 75 wpm (60×1.25), 4.5 wpm ($6 \times .75$), and 87.5% (70×1.25). The 25% improvement rule is used unless the criterion levels exceed proficiency. Proficiency in oral reading is defined as 100 correctly read wpm or better, and 2.5 incorrectly read wpm or less. The proficiency requirement for comprehension is 90% or better. Once established, each student's desired performance level is held constant until he is reading at grade level.

The next step is to inform each pupil that he can skip all remaining stories in a section of the book if, on the same day, his reading rates and comprehension scores equal or exceed his criterion scores. If Fred's oral reading rates were 75 and 4.5 wpm, and his comprehension score met or exceeded 87.5% on the same day, he would be allowed to skip ahead to a new section. A student is allowed to skip each day he performs at or above his desired levels. Therefore, a student may complete an entire reader in a minimum of four days.

If a pupil's scores remain low, and he does not skip for four consecutive days, drill techniques are scheduled. Three types of drill are used, one for each measured behavior: oral correct rate, oral incorrect rate, and comprehension percentage. The student only receives drill on those aspects of reading that are below desired scores. A student, on one day, could receive drill on one component, any two, or

for all three. Drill procedures remain in effect only until a pupil skips a section. Four days of data must be taken in each new section before drill is again scheduled.

If a child does not reach his criterion score in correct rate, he is required to read the last 100 words from the previous day's assignment. He continues reading that passage until he can complete it at his criterion level.

If his incorrect rate is too high, the pupil is shown a list of the words he mis-read embedded in phrases from the reader. The list of phrases is rehearsed until the pupil can read all of them correctly to the teacher.

Comprehension drill includes returning the pupil's answer sheet to him with the incorrect responses checked. The pupil is required to reword each answer until they are all correct.

Our data indicate that some children never need to drill, the opportunity to skip is sufficiently reinforcing. Other students seldom skip without drill. Contingent drill should be a permanent component of their program.

Marty's skipping data. One student's daily performance in the skip program are shown in Figure 8. Marty was 8 years old and in the third grade. According to the reading placement inventory, his instructional reading level was 1. His baseline performance confirmed this prediction. Marty's 25% desired levels were computed from his baseline scores and skipping was initiated. Marty's "skipping" rates were 56 correct wpm, 2.9 incorrect wpm and 79.3% correct comprehension. Over the next 19 school days, Marty skipped 7 times, averaging 2.7 days per section. By skipping, Marty was able to complete two readers and to improve both reading and comprehension performance. All of Marty's skips occurred without the necessity of drill.

To determine whether these improvements would maintain, baseline conditions were re-established. Marty was not allowed to skip during this phase, yet his scores remained stable and his average comprehension performance improved. The opportunity to skip was reinstated at the beginning of the next school quarter. Marty reached grade level (3) after seven weeks of skipping.

Insert Figure 8 about here

The success of the skip program may be due to either the opportunity to skip or the use of contingent drill. It appears that skipping is sufficient motivation to improve reading and comprehension performance for some students. Others seem to need the added incentive of contingent drill. The research at the EEU and verbal reports from classroom teachers indicate that this program is easy to implement and highly effective for most children.

Standard procedures have been suggested for the skip program, however, modifications may be implemented to meet the needs of individual students. Some children may be poor writers, therefore, questions or answers may be administered orally or by use of a tape recorder. Similarly, the assignment could be shortened. Finally, students may be allowed to pre-read their stories silently before the oral reading session. As previously mentioned, pre-reading often results in greater fluency and accuracy. Any modifications should be based on each student's performance.

Fluency - Level 3

Movin' on. Independent reading is the goal when a child can read instructionally at grade level. The 'movin' on' program was designed to help students learn to read fluently and independently in material appropriate for their age groups. The program includes both repeated readings of segments of stories and contingent drill.

A student begins the movin' on program if he is placed in his grade level book on the basis of the reading placement inventory or when he has completed all lower books during the reading skip program. The student may choose to read any story in the book in any order. He may not choose to re-read a story.

The general procedures in the movin' on program and reading skip are similar. Daily 500-word assignments are completed and 20 comprehension questions are answered with short written responses (5 recall, 5 sequence, 5 interpretation and 5 vocabulary). Feedback and assistance are provided for oral reading and comprehension as discussed previously.

Four modifications of the skip program are included in movin' on. First, the desired levels of performance are standardized for all students. In the skip program each student was allowed to omit portions of his reader based upon 25% improvement over his own baseline performance. In the fluency program a student 'moves on' when he is able to read grade level material at an average of 80-100 correct wpm with 3 or less incorrect wpm and 90% comprehension for five consecutive days. Analysis of previous data suggests that this is the minimal level of performance necessary for independent reading (Starlin, 1970).

Second, the concept of repeated readings is introduced. Each 500-word segment is re-read daily until desired performance levels are attained. Overall reading performance seems to improve when proficient reading is required on each segment of a story.

Third, a bridge to total silent reading is provided by allowing each student to preview their assignments silently. Proficiency in oral reading appears to be a prerequisite for mature silent reading. When a child has little difficulty in decoding he can concentrate on the content of the story.

The fourth modification is increased participation of the student in the decision making process. After pre-reading a new assignment, the student has the option of practicing vocabulary before attempting to move on. If the student reads orally at or above his desired rate for the first two minutes, he has the option to omit orally reading the remainder of his assignment.

The procedures used in movin' are as follows. First, each student silently pre-reads his assignment. He is given assistance when requested in pronouncing or understanding unknown words. Next, the student decides whether to work on vocabulary or to try to move on. If the student selects word drill, the teacher chooses about 20 words from the story that the student has difficulty decoding and writes phrases containing these words. The student practices each phrase until he can say it correctly and without hesitation to the teacher.

A two minute sample of performance begins the reading session. If the student's scores during the two minutes meet or exceed the desired reading rates (80 correct wpm with 3 incorrect wpm), then he may choose to leave and complete his comprehension questions or remain and finish orally reading his assignment. If the student's correct oral reading rate falls below criterion, he is required to orally read the remainder of the assignment. If the student's incorrect wpm rate is above the desired level, he is required to drill on each incorrectly read word committed during the entire assignment.

Comprehension questions are completed after oral reading. As before, students are not allowed to refer to the story. The questions are later corrected and rereturned. If a student has not attained the desired correct percentage of comprehension, he is required to rework each incorrect answer until it is correct.

Students who perform at desired levels on all three measures move on to the next section of the story. Students who fail to perform at their desired level receive drill on the measure or measures they failed and re-read the same section of the story on the following day. On each subsequent re-reading, the student repeats those portions of his assignment which were not proficient.

Data from the movin' on program has been analyzed for four intermediate aged boys (Hansen, 1975). The program resulted in improved oral reading and comprehension.

Children who perform at the fluency level in the learning hierarchy are encouraged to broaden their interests through reading diverse materials. The basal reader approach is de-emphasized as children begin to use decoding skills proficiently. Library books, newspapers, and material in other content areas such as science and social studies are introduced. Comprehension skills may be expanded to include critical reading and appreciation.

Maintenance, Generalization and Application - Levels 4 and 5

Maintenance, generalization and application of reading skills, although listed as the final levels of the learning hierarchy, should be stressed throughout the reading program. At each level opportunities should be provided for reading and listening to library books, magazines, newspapers or even cereal boxes. Children need to be shown that the skills they have learned in the classroom can be used in many different situations. The generalization and application of skills is not always automatic but may need to be fostered by both teachers and parents.

Proficient readers should be challenged to apply their reading skills in a wide variety of settings and materials. Research on procedures to achieve generalization of reading skills for mildly and moderately handicapped children is limited. Until recently the emphasis of our research project has been on initial and advanced acquisition of reading skills. Future research in the areas of maintenance, generalization and application will extend our knowledge. This research should investigate whether procedures which have aided the generalization of skills for non-handicapped children will prove successful with the handicapped.

Generalization and application of reading skills is promoted through varied and extensive reading. Proficient readers are no longer limited to choosing between basals and high-interest low vocabulary books. Group discussion and book sharing opportunities can be used to increase interest in reading and open new areas to be explored. Higher level comprehension skills such as appreciation, critical reading and evaluation are developed through conferences and group discussions.

Students are no longer dependent upon oral reading. Because content rather than decoding is emphasized, the bulk of reading will be silent. A final area of emphasis is the development of study skills such as: scanning to locate information, finding main ideas, using references and even writing essays. Proficient readers now use their skills to unlock new worlds rather than struggling with basics.

None of the suggested strategies for teaching reading are exclusive. They may be combined and modified depending upon each student's needs. The crucial aspect of these programs is that they were developed and tested based upon pupil performance. Pupil performance in terms of reading fluency, accuracy and the ability to comprehend are sensitive indicators of each student's placement in the reading hierarchy.

EVALUATION

Selection of "perfect" programs is not sufficient to insure success because children and their needs change. Programs will need to be modified and children promoted to the new levels. Knowledgeable decisions

based on performance will insure that children continue to receive appropriate instruction throughout the year.

Individualization implies both individual programs and individual rates of learning. Some students quickly acquire new knowledge and easily generalize skills to other areas. For other children the teacher must creatively modify strategies to insure progress. Still other children "learn how to learn," and rapidly achieve reading proficiency.

The concerned teacher will obtain and analyze data on target behaviors frequently to facilitate decision making. Thus, when teaching phonics, the teacher should obtain data on a child's ability to say phonemes. Similarly, if the goal is to increase the ability to comprehend, the teacher may keep a record of the child's performance on specific types of questions.

Data should also be frequently obtained on long-term goals. For example, the immediate target behavior for Delbert may be to say phonemes in isolation but his long-term goal is to improve reading in context. Data should be collected on both skills. The only reason to teach phonemes in isolation is to improve reading in context. If concurrent gains in contextual reading are not observed when phonemic instruction is provided, the target behavior should be changed or dropped.

Improvement of a child's ability to read and comprehend materials appropriate to his age and grade level is a common goal in remedial reading. Periodic assessment of the student's ability to read and answer questions at this level while instructing him at a level appropriate to his current ability, is one method of evaluating progress. Generalization and transfer of skills may also be assessed in this manner.

Data collection is useless unless it is used to evaluate progress and make decisions. Two types of analysis are appropriate in reading. Analysis of lines of progress indicates whether the student is improving in performance and allows the teacher to make predictions of when goals will be met. Children who are practicing newly acquired skills in materials of equivalent difficulty should exhibit daily improvement and accelerating lines of progress. This type of analysis is discussed in detail in Chapter 7.

A second type of analysis, often not reflected in daily data but important for decision making is growth analysis. Two types of improvement occur in reading: a) improvement in reading fluency, accuracy and ability to comprehend in materials of a specific level, and b) ability to read and comprehend materials of increasing complexity. The second type of improvement is referred to as growth in reading. Growth may be measured in terms of number of skills learned, books completed, skips made or program changes implemented.

Insert Figure 9 about here

Marty's reading improvement may be summarized and reported in two ways. First, overall changes in performance could be reported. Marty's average correct reading rate improved 85% from 33.7 wpm to 62.2 wpm. His average incorrect reading rate improved 53.2%, from 7.9 wpm to 3.7 wpm, while his average percent correct comprehension changed from 70.7% to 91.9%; a 30% gain.

A second method could be to merely report Marty's improvement in his grade level reader (Book H). Marty's reading and comprehension performance in this reader improved dramatically between September and June. His word accuracy changed from 83% to 95%, while his ability to comprehend improved from 73% to 100%.

Evaluation has multiple uses. It is used to modify existing programs, implement new programs and summarize progress throughout the year. Evaluation is useful when communicating information about a student's progress to parents, future teachers, and administrators. These methods of evaluation are valuable because the data are obtained directly from the materials the student has used and measure those specific skills that have been taught during the year.

Evaluations are most relevant when data are obtained directly from materials the student has used and on skills which he has learned.

In some programs, such as reading skip, growth analysis is more appropriate than analysis of lines of progress. The teacher should not expect to see improvement in lines of progress if the student is moving quickly through readers because of the increasing complexity of materials.

Making decisions to change teaching tactics within programs is a fairly straightforward procedure. If a student fails to make progress or is not progressing quickly, a change is indicated. Unfortunately, deciding when to initiate new programs is less clear; periodic assessment of higher level skills and/or the willingness to move two steps forward and one step back may alleviate this dilemma.

Children should always be instructed at a level where they are challenged but not frustrated. This level can only be determined by observing the child's performance. Some authorities contend that if a child has less than 75% comprehension in reading he will be frustrated (Betts, 1957). We have frequently placed children in readers where their ability to comprehend was less than 75% accurate. These students approached their assigned tasks eagerly and improved in performance over time (obviously these children had not read the authorities).

Summative evaluation is another type of decision making. It concisely summarizes each student's progress and is used to communicate with parents and administrators. Achievement tests, traditionally used for summative evaluation, may not accurately reflect a pupil's entering level of performance or his growth throughout the year (Chapter 3).

An alternative form of summative evaluation is to describe changes in performance in increasingly difficult material. These comments are

derived directly from daily data. For example, the teacher may report that initially Sally was placed in the reading skip program. She moved 2.8 books (from grade level 1¹ to 2²) while her average reading rates increased 10 correct wpm, decreased 3 incorrect wpm and percent comprehension increased by 15% during the semester. This information is more specific and helpful than merely stating that Sally is reading at a 2 grade level.

Comparison of each student's pre and post performance on the ASBAK or reading placement inventory is another form of summative evaluation. Pre-post comparisons are useful indicators of overall changes in reading performance. For example, Marty was placed in a 1² Lippincott reader for instruction (see Figure 1). The skip program was initiated to increase his reading and comprehension performance (see Figure 7). In June, Marty was reading on grade level in a 3² reader. When reading placement inventory was re-administered in June, Marty's performance in all Lippincott readers had improved. Figure 9 shows Marty's pre and post test performance.

SUMMARY

Reading is far more complex than merely decoding a collection of words. It is the dynamic communication of thought through print. Throughout this chapter we have suggested that reading be taught in a manner that emphasizes meaning. Reading instruction should be conducted within meaningful contexts whenever possible to allow children to use their language expectancies. Contextual reading also makes the instructional period more interesting. Well-rounded reading programs provide opportunities for generalization and application through inclusion of a wide variety of materials.

The intent of this chapter has been to provide teachers with research based procedures for the initial assessment of reading difficulties; placement in appropriate instructional materials; suggestions for instructional tactics; and methods of the evaluation of reading progress.

Two methods of diagnosis were suggested: diagnosing specific skills and diagnosing in context. The choice of diagnostic method depends on the child's ability to read in context. Multiple strategies based on pupil performance were suggested for remedial reading instruction. These strategies may be used alone or in combination. Data should be obtained frequently to evaluate the effectiveness of these strategies and to determine the most opportune time to change the emphasis of the reading program. Finally, two types of evaluation were discussed: formative and summative. Evaluation is important for decision making and communicating with parents, teachers and administrators.

These procedures were developed to meet the needs of mildly and moderately handicapped children. They represent the current state of

the art in reading instruction at the Experimental Education Unit, and are subject to modification in accordance with subsequent replications. Teachers are encouraged to draw from these suggested teaching strategies and devise their own remedial reading programs based on student performance.

Our research has indicated that matching children to teaching strategies on the basis of their performance on reading tasks results in better progress than assigning programs by guess or by chronological age. Not all strategies such as word drill or skipping, are equally effective for all students. Some children begin to enjoy reading when decoding is no longer a struggle. Other children will need additional motivation to continue to try to improve their skills. Reinforcement is often effective for children who fail to apply known skills. Tokens, chips and free time have been used successfully to improve reading rate, reduce reading errors and increase students' ability to comprehend (Lovitt, Eaton, Kirkwood & Pelander, 1972; Lahey, McIlrees & Brown, 1973).

Teachers should be cautioned to use reinforcement only when children have developed the pre-requisite skills in the desired task. Reinforcement should never replace instruction, but can often be effectively used as a companion to good instructional strategies.

Data collection should compliment whatever strategy a teacher selects. While data should be obtained frequently on a child's ability to read, it should not be used in lieu of instruction. Testing is not teaching; daily testing does, however, indicate if selected teaching procedures are successful. A one-minute sample of a child's reading performance is a good indicator of his current abilities. Additional guided instruction is essential if the child is to improve his performance.

It is not easy for teachers to abandon their manuals and workbooks and begin to individualize and modify student's programs based on performance. Individualization takes extra time, patience and energy, yet is essential if failure-prone children are to succeed. The benefits of a performance based reading program outweigh the cost. Teachers are able to precisely diagnose problems and select strategies which are most likely to help each child learn to read. They can continually monitor children's progress and make changes necessary to maintain growth. Any change in a child's program is based on his needs, not on superstition.

The benefits of such a system for teachers are great; the benefits for students are immeasurable. They gain selfconfidence by seeing their own growth and daily improvement. And best of all, now that they have learned to read, they can read to learn.

TABLE 1

MEDIAN CORRECT AND ERROR PERFORMANCE PER
MINUTE ON READING TASKS OF ASBAK
ASSESSMENT INVENTORY FOR VANCE
AND TWO CLASSMATES

<u>Reading Measures</u>	<u>High Student</u>	<u>Low Student</u>	<u>Vance</u>
1. Say alphabet (no cue)	244/0.0	137/0.0	312/0.0
2. Recognize letters in order	197/4.0	140/0.0	153/1.0
3. Recognize letters in random order	104/1.0	89/3.0	72/0.0
4. Say single consonant/vowels	59/2.8	69/5.0	53/4.0
5. Say multiple sounds (digraphs, diphthongs, etc.)	57/3.0	39/11.0	27/12.0
6. Read words in context (Lippincott G, pg. 94-95)	136/0.0	40/21.0	35/14.0

Table 2
PRE-READING AND BEGINNING READING SKILLS*

1. Sequence Left to Right	1.1	Identify front of book
	1.2	Locate first word on page
	1.3	Move finger as we read
	1.4	Identify first letter of randomly selected words
	1.5	Sequence pictures right to left
	1.6	Track from end of line to next line
	1.7	Turn pages as we read
2. Auditory Memory	2.1	Isolate letters (different-similar)
	2.2	Random letters in sequence (2 - 6 letters)
	2.3	Words 2 - 6 letters (sim. & dif. letters in all positions)
	2.4	Phrases (3 - 7 words)
3. Visual Memory	3.1	Isolate letters (different & similar)
	3.2	Random letters in sequence (2 - 6 letters)
	3.3	Words, 2 - 6 letters, (sim. & dif. letters in all positions)
	3.4	Phrases (3 - 7 words)
4. Oral Context	4.1	Noun
	4.2	Verb
	4.3	Adjective
	4.4	Preposition
	4.5	Adverb
	4.6	Pronoun
5. Visual Discrimination	5.1	Isolate letters (upper & lower case)
	5.2	Words (2 - 7 letters) sim. & dif. letters in all positions
6. Auditory Discrimination	6.1	Isolate sounds (consonants, short vowels, long vowels)
	6.2	Identify consonants in words
	6.3	Long & short vowels in all positions
	6.4	Consonant blends
	6.5	Digraphs (consonant, vowel)
	6.6	Vowel diphthongs
	6.7	Number of syllables

*Halsch, 1973

Table 3

SUGGESTED TEACHING PROCEDURES BASED ON PUPIL PERFORMANCE

Level	Performance			Strategies
	Correct Rate	Error Rate	Comprehension	
1. INITIAL ACQUISITION	0-20	>8	0-33%	BASICS .Grapheme-Phoneme Correspondences .Word families .Word attack skills .Focus .Error word drill .Beginning comprehension skills
2.1 ADVANCED ACQUISITION	20-45	3-7	30-50%	STRATEGIES FOR DECODING .Previewing .Try another way .Word analysis skills .Use of context .Does it make sense .Comprehension or small sections
2.2	45-80 (below grade level)	3-7	50-80%	ADVANCING TO GRADE LEVEL .Skip .Reinforcement
3. FLUENCY	45-100 (at grade level)	3-5	50-100%	POWER BUILDING .Movin' On .Bridge from oral to silent reading
4. MAINTENANCE & GENERALIZATION	>100	>3	90-100%	CHALLENGE .Wide reading ."Appreciation" .Critical Reading .Reading in content areas
5. APPLICATION	>100	>3	90-100%	SILENT READING .Same as Level 4 - emphasis on literal and inferential comprehension .Study skills -Scan -Main idea -Use of references -Write essays

Table 4
Mean Median Correct & Errors
and Mean % Correct

		Condition A Baseline	Condition B New Word Drill	Condition C Error Word Drill
Stephanie	correct rate	39.0	53.0	67.0
	error rate	43.0	9.0	3.2
	% correct	60%	80%	95%
Diane	correct rate	30.0	37.0	42.0
	error rate	10.0	9.0	5.0
	% correct	76%	80%	89%
Anders	correct rate	60.0	63.0	71.0
	error rate	3.4	2.5	3.2
	% correct	93%	96%	96%
Peter	correct rate	19.0	36.0	34.0
	error rate	12.6	7.7	4.7
	% correct	50%	83%	88%
Jennifer	correct rate	77.0	82.0	90.0
	error rate	2.5	1.4	1.0
	% correct	97%	98%	99%
Michael	correct rate	31.0	41.0 (-)*	41.0(x)
	error rate	6.5	6.0(x)	6.0(/)
	% correct	83%	87%	87%
Group	correct rate	42.6	52.0	57.5
	error rate	9.0	5.0	3.8
	% correct	78%	87%	92%

*This sign in parenthesis indicates direction of data movement. An X sign indicates that the scores during the phase were increasing and a - sign indicates that the scores were generally decreasing.

TABLE 5
EARLY COMPREHENSION SKILLS: "WHAT" QUESTIONS

What is _____					
+ this?	+ adj.?	+ verb?	+ prep.?	+ direct object?	+ doing?
1. picture cue					
2. picture cue + written question (teacher read)					
3. picture cue + written question (child read)					
4. written question (teacher read)					
*5. written question (child read)					

*Criteria

TABLE 6
WORD ATTACK STRATEGIES

- Level 1 - Student self-corrects without prompting
- Level 2 - Teacher says "Try another way"
- Level 3 - Teacher cues student to use structural analysis or syllabification to determine correct word
- Level 4 - Teacher cues student to use context to determine correct word, ("does it make sense")
- Level 5 - Teacher provides aided visual cues by writing a portion of the word on a piece of paper or covering a portion of the word to isolate the root word or a syllable
- Level 6 - Teacher provides phonics cues; ("What sound does 'oi' make?")
- Level 7 - Teacher provides aided oral cues by telling student the phoneme or word; (C-A-T spells "cat")
- Level 8 - Any errors the teacher chose not to correct, are included in this category.

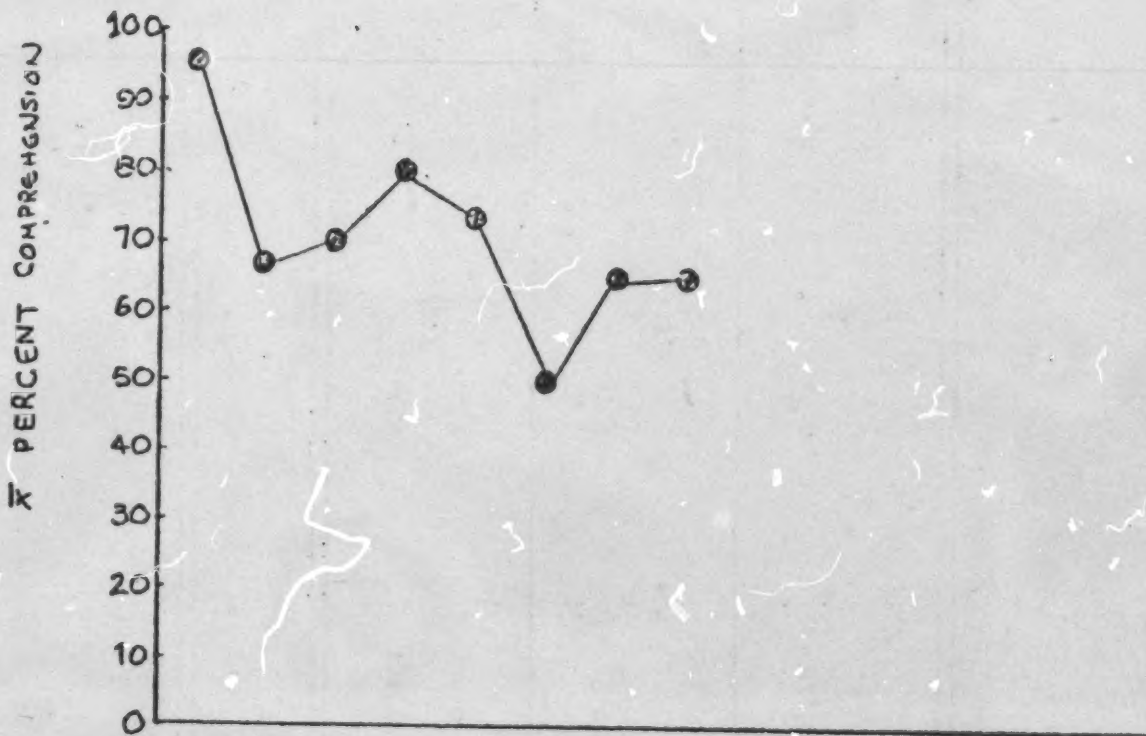
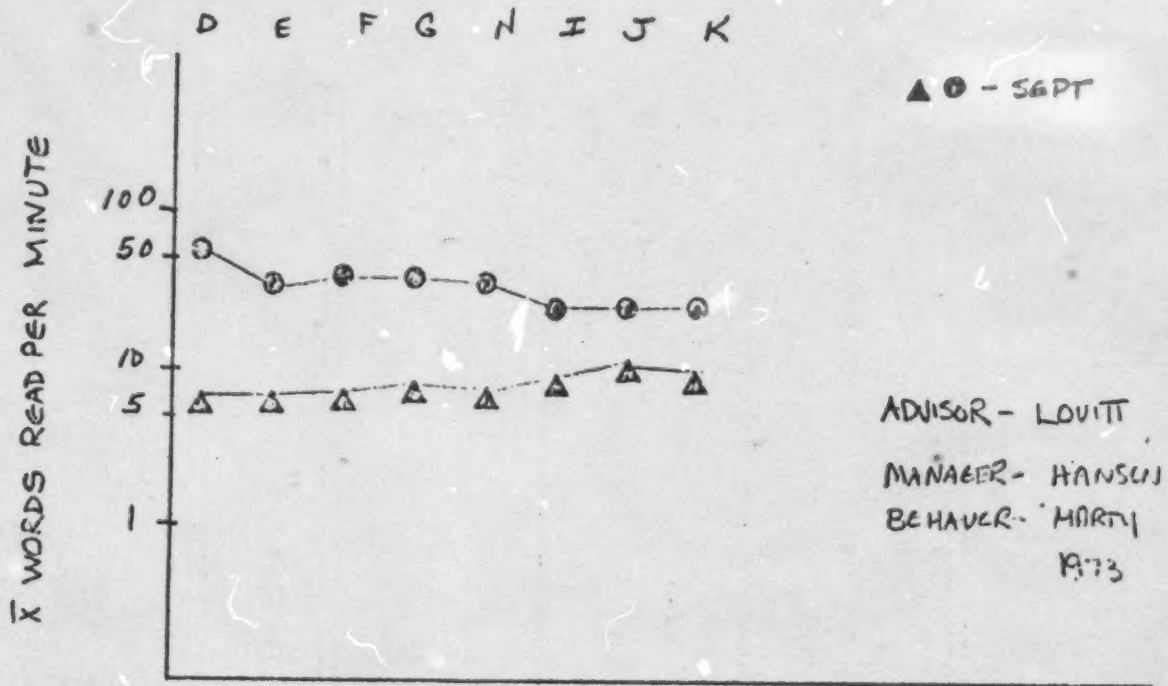
TABLE 7
X Errors/Day

	Conditions	Self Correct	Try Another Way	Aided Visual, Structural Analysis, Context, Phonics	Aided Oral	Other	Percent
OMIT	Baseline	.53	0	0	1.41	.18	11.5
	Corrective	.25	.18	0	.11	.18	5.6
SUBSTITUTE	Baseline	2.09	0	0	3.82	.29	33.7
	Corrective	1.71	2.07	.12	.25	.25	34.0
MISPRONOUNCE	Baseline	1.59	0	0	5.21	0	17.0
	Corrective	1.82	2.39	.86	.64	0	14.3
DON'T KNOW, GARBAGE, INSERT	Baseline	.35	0	0	2.68	.24	17.8
	Corrective	.04	.57	.82	.46	.18	16.1
Percent	Baseline	24.8	0	0	71.5	3.8	
	Corrective	29.7	40	13.9	11.3	4.8	
TOTAL $\bar{X}$ ERRORS/DAY	Baseline						18.39
	Corrective						12.9

TABLE 8

Mean Medians, % Word Accuracy Scores
and % Change

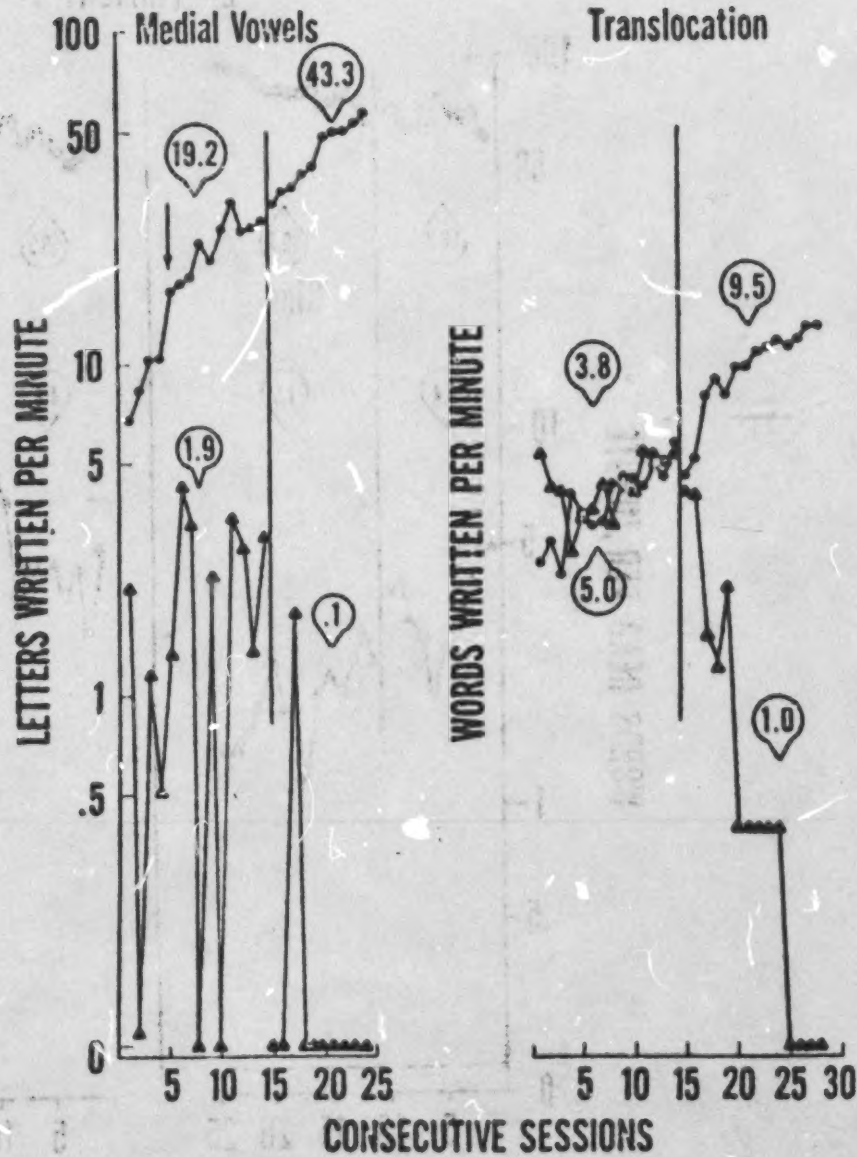
		ORAL w/o FEEDBACK		ORAL w/ FEEDBACK		LISTEN		SILENT	
CORRECT RATE	Baseline	78		56.2		49.7		54	
			+26.9		+36.7		+46.3		+21.9
	Intervention	99		76.8		72.7		69.5	
ERROR RATE			-7.1		-2.3		-11.8		-26.5
	Baseline	92		75		64.1		51.1	
ERROR RATE	Baseline	11		6.5		5.6		3.8	
			-27.3		-58.5		-37.5		-7.9
	Intervention	8		2.7		3.5		3.5	
% WORD ACCURACY			-25		+96.3		+37.1		+28.6
	Baseline	6		5.3		4.8		4.5	
% WORD ACCURACY	Baseline	88		90		88		93	
			+5.7		+7.8		+9.0		+2.4
	Intervention	93		97		95		95.2	
% WORD ACCURACY			+1.1		-1.0		-2.1		-3.7
	Baseline	94		96		93		91.7	



PLACEMENT DATA

Figure 1

EXPERIMENT 1

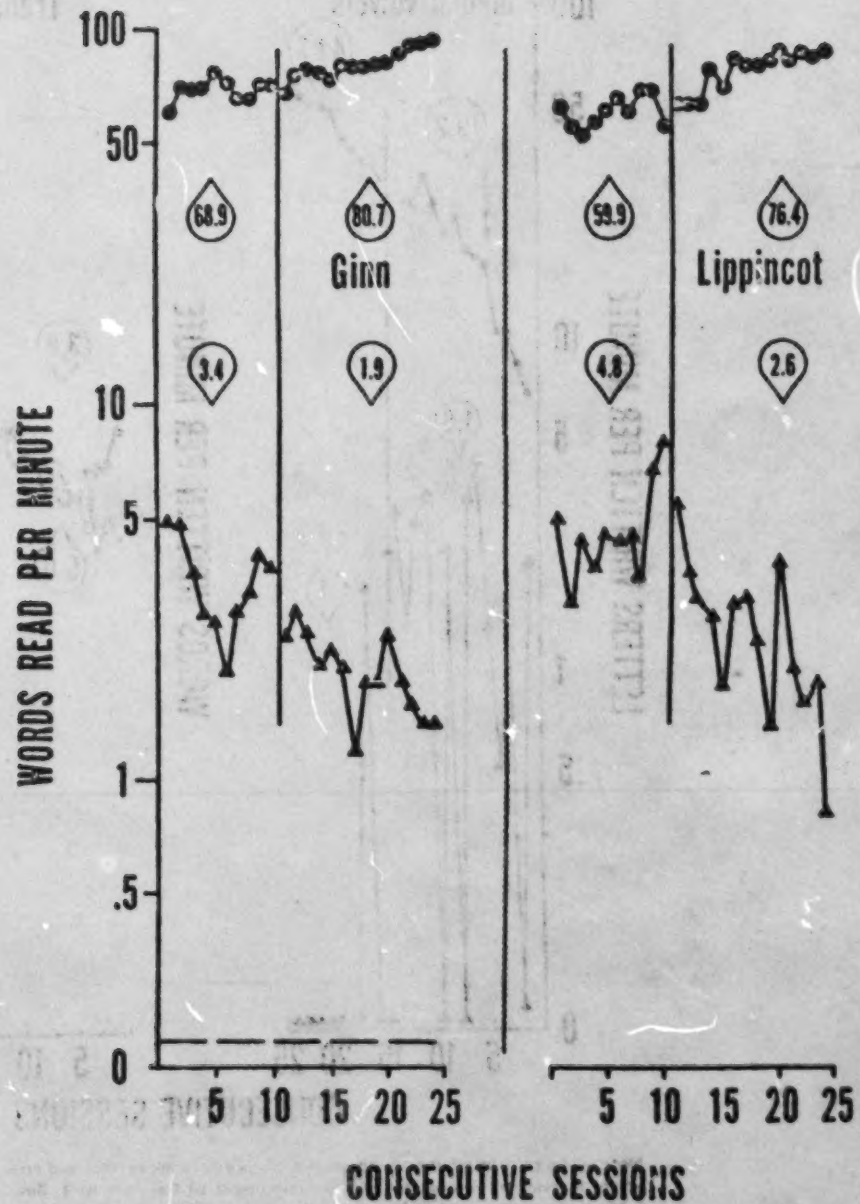


Note.—The portion of the figure on the left presents the correct and error rates for the medial-vowel assessment throughout the two conditions of Experiment 1. Similar data for the translocation task are presented in the right portion of the figure. Noted on the fifth session was when measurement began in oral reading. Correct- and error-rate means are included.

Figure 2

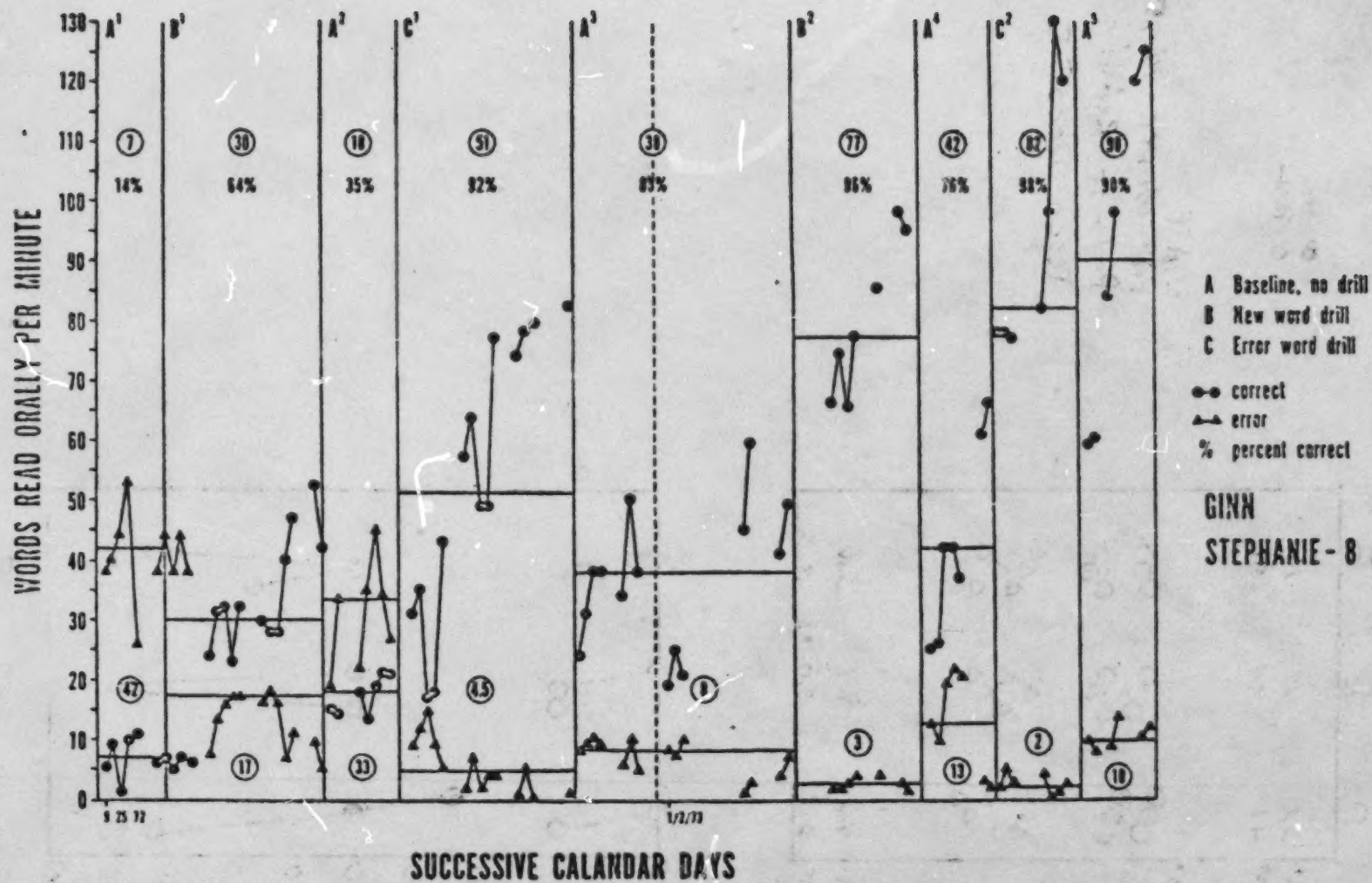
Correct and Error Rates for Letters and Words Written Throughout the Two Conditions of Experiment 1

EXPERIMENT 1



Note.—The portion on the left presents the data from the Ginn reader; the right, data from the Lippincott text. Correct and error rate means are included.

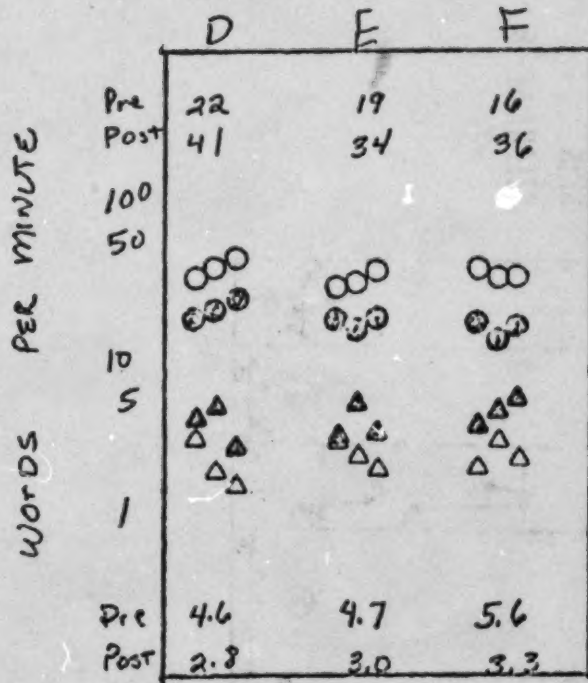
Figure 3
Correct and Error Rates for Oral Reading Throughout
the Two Conditions of Experiment 1



GINN
STEPHANIE - 8

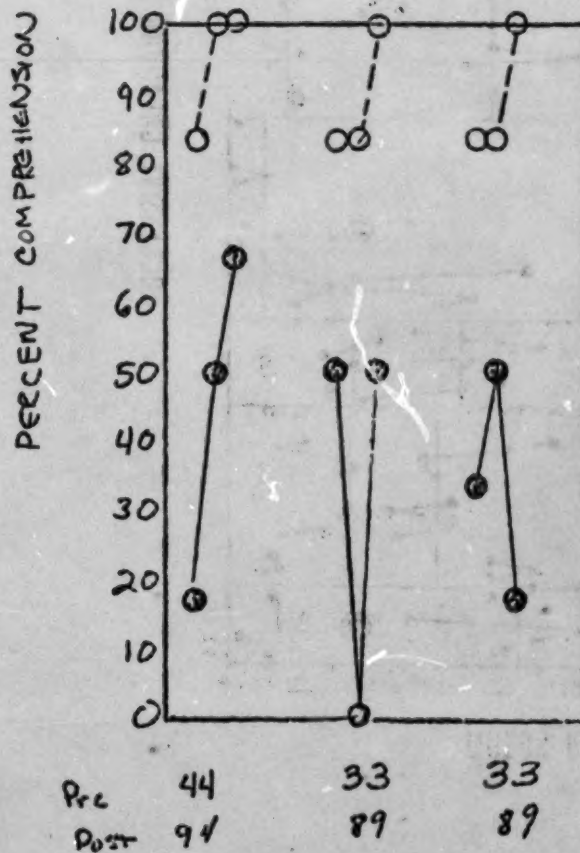
Lippincott

Figure 5



● Pre
○ Post

MATT
Fall-Winter 74-75
Pre/post Reading
Teach DecoDE



ADVISOR - BENNETT
 HALLAGRO - HALL
 METALFE
 BENHALL - TOLD
 FHS

$\bar{x}$ reading rate 91.1/4.0

$\bar{x}$ reading rate 107/3.2

$\bar{x} = 60.5\%$

$\bar{x} = 83.9\%$

$\bar{x} = 85$

$\bar{x} = 84$

$\bar{x} = 82$

mixed:
 fact
 inference
 sequence
 main idea

what

what
 who

what
 who
 where

% Correct Comprehension

100
 80
 60
 40
 20
 0

3
 2-5

10
 PP-3.5

1.7

Figure 6

FIGURE 7

CORRECTIVE CUE DATA SHEET

Name _____ Book _____

Date _____ Pages _____

Type of Error

Type of Correction Procedure

	Self Correction	Try Another Way	Structural Analysis Syllabication	Context	Aided Visual Cue	Phonics Cue	Aided Oral Cue	Other	Total
Omit									
Don't Know									
Substitution									
Mispronunciation									
Garbage									
Insert									
Total									

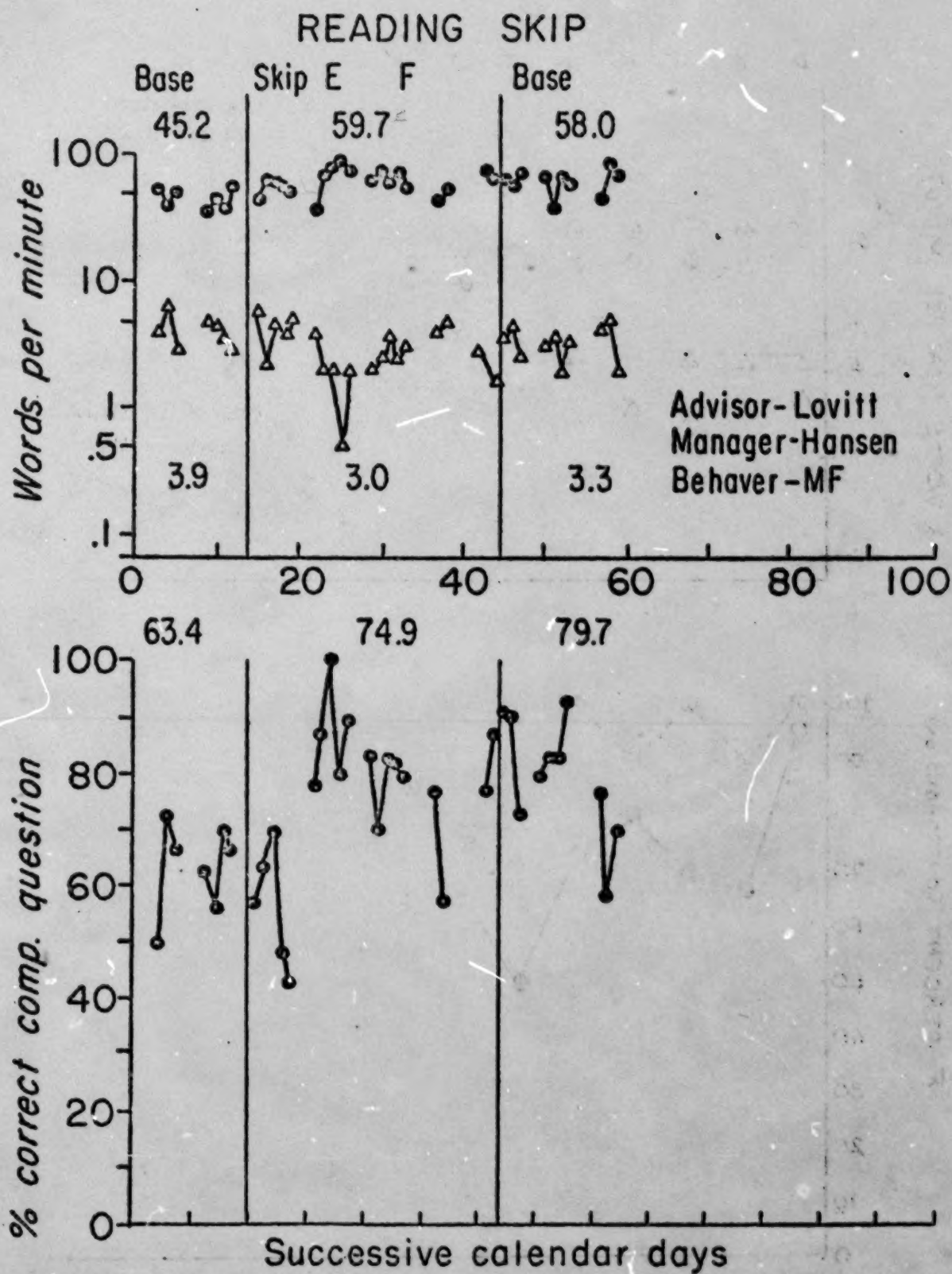
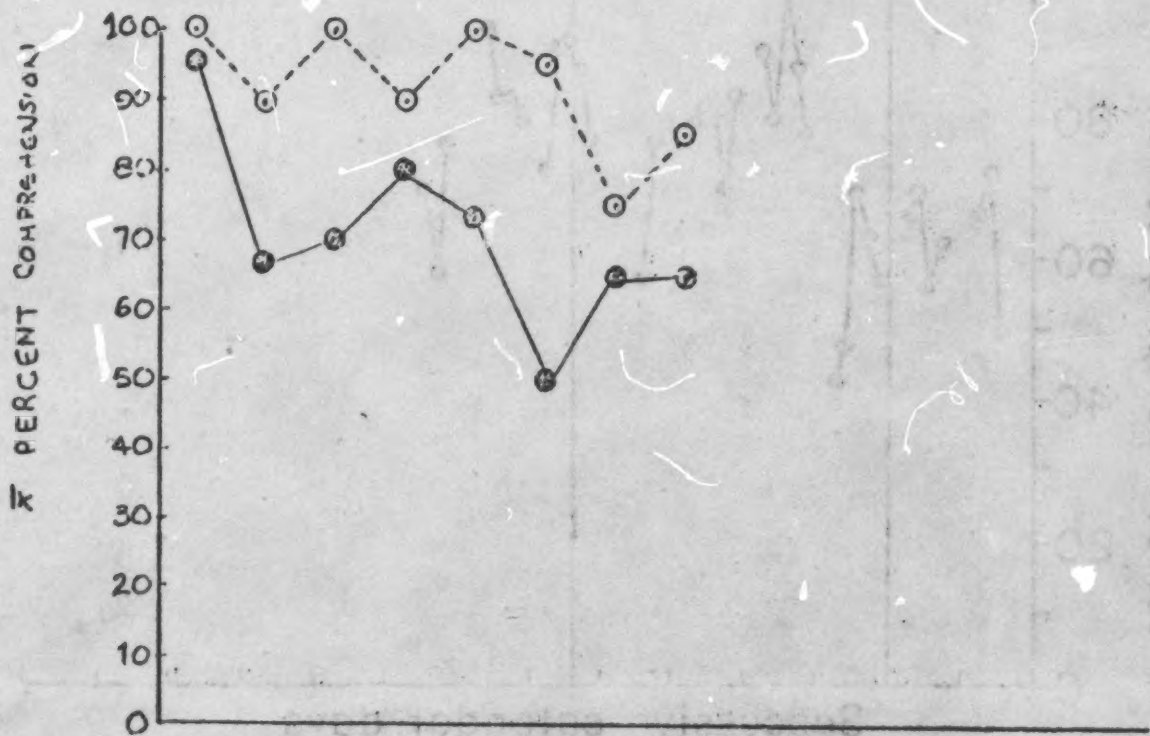
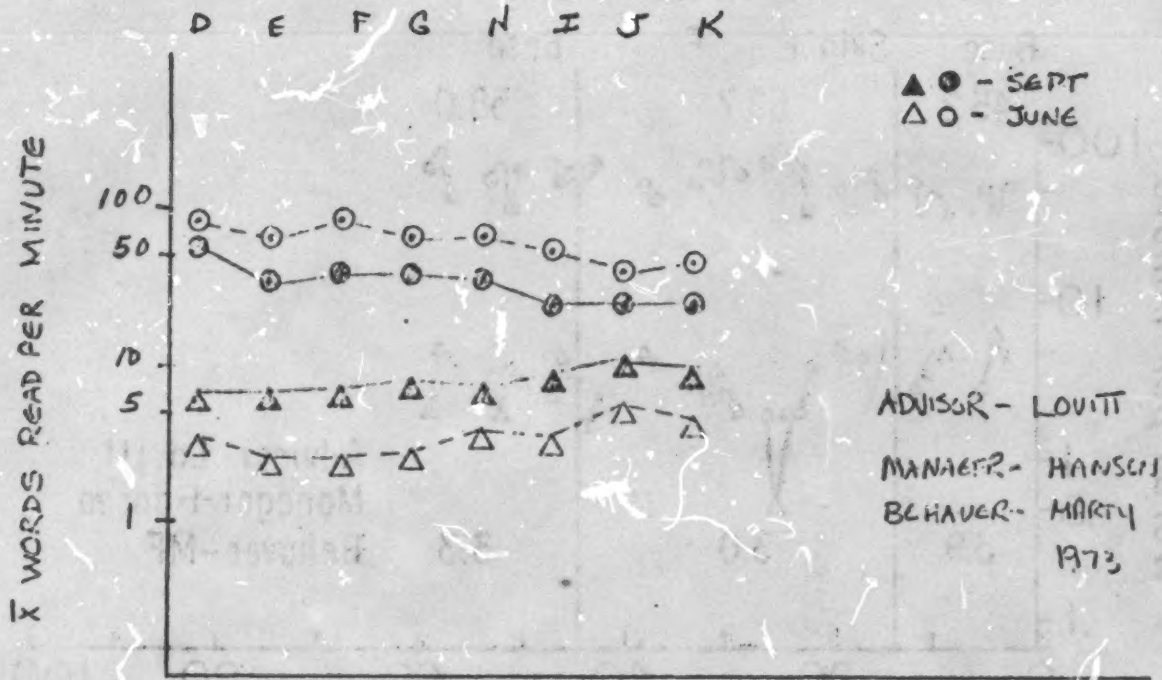


Figure 8



PLACEMENT DATA

Figure 9

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CHAPTER 4

WRITING SKILLS

When a child learns to read, he gains information unavailable orally. The communication circle is complete when the child can in turn transmit information and feelings through writing. Despite the prevalence of typewriters, dictating machines, and telephones, handwriting continues in its importance as a needed skill. Students use writing for most compositions. Adults use writing for taking notes, writing letters, preparing scripts and reports, signing checks and various business documents.

Accurate spelling and legible penmanship facilitate handwritten communication. They enable the writer to compose documents which are permanent and easily understandable. Proficiency in these skills is a measure of literacy in our society. People may jokingly refer to their spelling and penmanship deficiencies; however, such jokes merely underline the importance of proficient writing.

Three facets of the writing process are discussed in this chapter: penmanship, spelling, and communication through writing. The procedures for assessing and teaching writing skills were developed to teach children who had failed to benefit from commercially published programs and established practices emphasizing group instruction. Where possible, specific research studies are cited to support these individualized systematic programs.

Children of all ages exhibit a wide range of difficulties in writing skills. Some are unable to hold a pencil correctly or form straight lines and circles. Other students can form letters but illegibility and/or inaccuracy in spelling impede communication. Still others are deficient in expressing themselves in the written mode: their ideas are "fuzzy" and mechanics negligible. Appropriate programs for helping students to write legibly and communicate effectively are individually determined. In each case students' performance provides the basis for planning and evaluating instruction. General guidelines will be suggested for the following: diagnosing each student's strengths and weaknesses in writing and spelling; sequencing tasks; organizing programs; choosing instructional strategies; and evaluating progress.

Penmanship

Legible writing is a prerequisite for effective handwritten communication. When legible handwriting is practiced, the reader can concentrate on what is being said rather than on attempting to translate scrawls and scratches. Illegible writing is not only difficult to read, but may also cause "mis-communication."

Teaching and developing good penmanship is not necessarily a dull, monotonous project. Short, specific sessions can provide adequate instruction to improve legibility without inevitably resulting in boredom. The act of learning legible letter formation need not be the monotonous task it appears to be in many penmanship sessions. Repetitious drills on every letter of the alphabet and lock-step group instructions are unnecessary for many children. Two early studies found directed teaching toward students' specific faults of illegibility resulted in improved speed and quality of handwriting (Cole, 1935; Lehman & Pressey, 1958).

Authorities disagree about which specific letters are universally troublesome for children. Several analyses of handwriting have shown that a few ill-formed letters contribute to over 50% of all illegibilities recorded at any grade level (Burns & Lowe, 1966; Freeman, 1962; Newland, 1958).

Effective penmanship instruction should entail individualization in specific letters taught to each child and in the amount of time spent practicing each letter to achieve proficiency. Students should be allowed to progress at their own speed throughout a penmanship program, attaining mastery of each skill prior to receiving instruction at the next level.

At the Experimental Education Unit, Hansen and Lovitt (1973b) found that students required direct instruction on only one fourth of the letters in the alphabet to achieve mastery on all letters. Apparently, students were able to generalize cursive writing skills without drilling on every letter. A second finding in this study was that students displayed unique patterns of acquiring cursive letters independent of any standard grouping procedure such as form, position on the line, or controlling strokes. Students learned letters in different orders and at different times. Finally, some evidence was found for generalization of writing skills from writing in isolation to writing in context. These data indicate that a systematic program which includes daily practice, contingent drill on selected troublesome letters, and provisions for transfer and generalization is effective for improving penmanship skills. The cursive writing program was easily managed and was completed in a short amount of time. Students achieved mastery on lower case cursive letters in only two to three weeks.

A penmanship program based on this research was developed to teach and improve children's ability to write in longhand. Recommendations are included for adapting these procedures for manuscript instruction.

Placement

Samples of each student's ability to print and write letters are obtained from the ASBAK (Academic and Social Behavior Assessment Kit, mentioned earlier in this volume) or from teacher designed assessment materials. The ASBAK measures five penmanship tasks: (1) drawing shapes, (2) printing manuscript letters, (3) printing manuscript capitals, (4) writing lower case cursive letters, and (5) writing upper case

cursive letters. These tasks discriminate between non-writers, manuscript writers, and students who have learned cursive writing.

ASBAK data may also indicate whether a student's performance is at the acquisition or fluency building level in the learning hierarchy. Students who score less than 90% in legible letter formation benefit from specific instruction on troublesome letters. When a student's penmanship is 90-100% legible, he/she may need practice to build writing fluency.

Multiple measures of specific writing behaviors answer three questions: (1) can the child correctly identify printed/cursive letters; (2) can the child form printed/cursive letters legibly in isolation with or without a model; and (3) can the child form cursive letters correctly when writing in context with or without a model? Subsequent instruction focuses on observed deficiencies on these tasks.

Cursive writing activity sheets are shown in Figures 1 and 2 (Hansen, 1974a). These activity sheets measure four writing behaviors: a) printing and saying equivalences between cursive and printed letters, b) formation of lower case letters, c) appropriate connections between cursive letters, and d) formation of capital letters. These activity sheets are used for both assessment and daily practice. Five days of data collection on each task are recommended to determine students' average performance. Students are encouraged to attempt each section of the activity sheet. Students' penmanship performance when writing words in context should also be analyzed. These data may be obtained in creative writing sessions or by having students copy short paragraphs.

Insert Figures 1 & 2 about here

Correction and Scoring

Students' penmanship abilities are usually measured qualitatively. Most traditional handwriting scales measure "general excellence" of writing (Anderson, 1969). These handwriting scales have four major drawbacks for use as daily measurement instruments. First, they are subjective: a sample of writing is visually compared to model specimens and ranked accordingly. They only provide a gross measure of change in performance (Rondinella, 1963). Second, the increments between model specimens are not equivalent (Herrick, 1963). A writing sample shown at level 4, for example, is not twice as good as a writing sample shown at level 2. Third, handwriting scales measure general merit, rather than specific faults in penmanship; therefore, they are not useful diagnostic instruments (Krathwohl, 1963). Fourth, they do not allow for fine discrimination in performance, so they are of questionable utility for use as daily measures.

A factor approach to measurement of handwriting is suggested as an alternative to rating scales. In this method, components of letters or words are analyzed separately. This approach is quantifiable, provides a sensitive measure of changes in handwriting performance and can be used to diagnose specific faults.

One factor approach to measuring handwriting was developed by Pelander and Willis (1970). Each letter or word is weighted according to prespecified criteria. Two components for each manuscript letter in isolation are scored: formation and slant. If the letters occur in words, a third component -- spacing between letters -- is added. The legibility of each cursive letter in isolation is scored according to three criteria: slant, formation, and ending. Words written cursively are scored on five components: slant, formation, ending, connections, and spacing. A perfect score for writing the alphabet is 52 for manuscript and 78 for cursive letters. Specific criteria for scoring each component of letters or words are as follows:

Slant: manuscript - 1 point is awarded if the letter is placed vertically to the line.

cursive - 1 point is awarded if the letter is slanted slightly to the right of vertical. Ex. = correct, = error (no point).

Formation: 1 point is awarded if the letter is formed as the model and is placed on the line correctly. Ex. _____

correct error error

Ending: (cursive only): 1 point is awarded if the ending stroke of the letter is included and begins to swing upward. Ex. = correct, = error.

Connectives: cursive letters - score each 2-letter combination as correct if the connecting stroke is made appropriately. Legibility is not a factor. Ex.

correct error error

cursive words - 1 point is awarded if all connections within a word are made correctly.

Spacing: 1 point is awarded if all separations between the letters in a word are equivalent.

Students receive 1 or 0 for each legibility factor per letter or word. For example, Jim may receive a score of 1-0-1 for "b," which means that his slant and ending were satisfactory but the letter was formed improperly. Each letter and word is analyzed in this manner and the results recorded on a data sheet similar to the following example:

Name _____

Date _____

<u>Letters</u>	<u>Points</u>	<u>Explanation</u>
a	111	good slant, formation, ending (3 points)
b	101	good slant, bad formation, good ending (2 points)
c	111	good letter (3 points)
d	011	bad slant, good formation, good ending (2 points)
e	111	good letter (3 points)
f	100	good slant, bad formation, bad ending (1 point)
g	-	printed or left blank (no points)
z		

Total Points 14

The reliability of this method for scoring is high. In the study cited previously (Hanson & Lovitt, 1973b) the teacher and a graduate student independently scored all activity sheets according to the criteria. The agreement for scoring averaged 95.7%.

After five days of data have been gathered, the results are analyzed to determine placement within the program for each student. Each lower case letter of the alphabet which has not received a perfect score for 2 out of 3 days is included in a student's pool of letters to be learned. If a student's average score is at least 90% legible and each alphabet letter written correctly for two out of three days, then his/her performance on connectives, capitals, and writing in context is analyzed. The student receives instruction and daily practice on any observed deficit area, and continues to receive instruction in each writing skill (lower case, connectives or upper case) until he or she attains mastery.

Instruction On Letters: Acquisition

The cursive writing program has five levels: 1) printing and saying equivalences, 2) writing lower case letters, 3) connecting letters, 4) writing capital letters, and 5) writing legibly in context. Non-writers are placed on level two of the program (writing lower case letters). Instruction in printing and saying equivalences (level 1) is provided concurrently until a student attains mastery of this skill. The remaining three skills are taught sequentially.

Daily practice includes writing the entire alphabet using the activity sheet and writing words in context. Instruction in the form of contingent drill on lower case letters is given on a maximum of five letters per day chosen from the pool of illegible and unknown letters. The student is informed that drill may occur, but does not have previous knowledge of the specific letters chosen for drill each day. A child only receives contingent drill when he/she illegibly writes any of the

five chosen letters. Contingent drill includes: a) telling the student why the letter was illegible, b) showing him/her how to write the letter legibly, and c) assigning a practice page with 20 opportunities to practice that letter by tracing and copying.

The five letters chosen for contingent drill change as the child gains proficiency in writing. A letter is removed from the set of contingent drill letters when it has been written legibly for two out of three days; then another letter is added. This procedure continues until the student has met criteria on all letters of the alphabet and his performance is at least 90% correct on the entire alphabet for five days.

The same sequence of activities is used to teach connectives and capital letters. Students should be encouraged (or required) to use legible penmanship in all their written assignments to provide additional practice.

The cursive writing program has been used successfully in tutorial and group settings for over three years at the Experimental Education Unit and in public schools. Four aspects of the program contribute to its effectiveness. First, specific drill focuses only on letters or connectives which are troublesome for a student. Second, having to do drill and to practice are contingent on performance on the daily activity sheet. Children are motivated to display their best effort on the activity sheet to avoid subsequent drill. Third, because the students do not know in advance which five letters will be chosen to be scrutinized each day, they are encouraged to perform their best in all letters. Fourth, students achieve mastery on each task before instruction is begun at the next level. This combination of procedures has enabled students to quickly and efficiently learn how to write letters and words legibly.

Building Fluency

Children who can form letters legibly in isolation may be unable to write proficiently and fluently in context yet handwriting should become automatic so that students are free to express their thoughts rather than have to concentrate on letter formation and legibility. Having fluent handwriting also increases the probability that students will be able to complete written assignments in a reasonable amount of time.

Various tactics to increase legibility and fluency in handwriting have been developed at the Experimental Education Unit, including: self-evaluation, "beat your rate," contingent correction of errors, pre-practice, and reinforcement. These tactics appear to have differential effects on handwriting: some result in improved legibility at the expense of fluency; others have the opposite effect. These tactics represent a beginning attempt at developing procedures to build writing fluency. Limited data are available on their relative efficiency. They are offered as a collection of ideas which may help children improve their handwriting.

Self-evaluation. Students who are made aware of the quality of their own writing often improve in writing skills. One method of self-evaluation, suggested by Cole (1935), requires students to compare their writing with a model selected as "their best effort." Another method asks students to analyze components of their writing. Students score each letter formation, connection, or spacing between letters. This method of self-evaluation was studied by Hansen (1974) with five students, ages 9-11 who had completed the basic cursive writing program. Each day after baseline, students evaluated their own handwriting on a five-minute copy task. A felt tip marker was used to underline each letter, connection, or spacing the student thought was incorrect. The students were told to mark "messy letters," letters which were not placed on the line properly, poor spacing, or letters of unequal sizes. Periodic reminders were made to "be tough on yourself."

An analysis of these data found that self-evaluation produced positive changes in writing rate and accuracy. Each student's average correct letters per minute (lpm), incorrect lpm, and percent accuracy were compared before and during self-evaluation. Positive changes were noted on all three measures for all students. Average correctly written letters per minute improved from 9.5 to 14.5. Incorrectly written letters per minute decreased from average 2.7 to 2.3. Finally, percent accuracy increased from 77.1 to 85.3. While performance changes were positive, the differences between the baseline and self-evaluation conditions tended to diminish over time for some students.

Contingent correction and pre-practice. Contingent correction of errors and pre-practice have been used to increase handwriting legibility (Finholt & Hansen, 1975). Contingent correction of errors consists of practicing illegible words if more than five errors are made in the copy task. Pre-practice is provided by having a student write "The quick brown fox jumped over the lazy dog's back" legibly as a warm-up exercise. Both of these procedures resulted in lower error rates but were not useful in building writing fluency.

Beat your rate. Two variants of the "beat your rate" method for increasing writing fluency have been studied (Finholt & Hansen, 1975). In the first instance, a card was affixed to each student's desk showing his or her average correct and error letters-per-minute rates for the previous week and highest daily rate. Prior to each writing session, these rates were discussed and students were encouraged to "beat your rate." This tactic was effective in increasing all students' correct letters-per-minute rate (average 4.1 lpm) and decreasing half the students' incorrect letter-per-minute rate. Beat-your-rate also was used to enable students to earn activities contingent on improved performance. This tactic was used with four students. They were able to increase their correct rates; however, error rates also increased for these students.

Summary: Penmanship

In summary, instruction in teaching and improving penmanship skills is most effective when it is individualized and concentrates on each

student's specific problems. Initial instruction in legible handwriting may be accomplished simply without resorting to movement drills, readiness exercises, or extensive drills on every letter in the alphabet. While direct instruction is useful in teaching children how to write letters in isolation, it appears that many children require additional help to become fluent writers in general writing tasks. Students seldom automatically transfer skills learned in isolation to writing in context. Opportunities to use legible penmanship throughout the school day will provide additional practice and facilitate maintenance, generalization, and application of legible handwriting. Students learn to write legibly and fluently if they are praised for neat handwriting and if illegible writing is consistently consequated. Various tactics have been used to increase writing fluency. To date, none of these procedures have been totally effective. Additional work needs to be undertaken to develop efficient methods for improving handwriting proficiency.

Spelling

Students are amazingly inventive in developing unique orthographies. Although their internal spelling rules are logical and consistent, they may not conform to accepted patterns and rules. These misspellings are often regarded as cute or humorous; however, the demand for literacy in our culture mandates that each child learn and use the accepted orthographies.

Traditional spelling textbooks usually teach spelling and language arts skills simultaneously. Instruction in sound-to-letter correspondences may be combined with word building, word meaning, dictionary usage, handwriting, and other conventions of writing. All these skills are extremely important in effective written communication. However, their complexity may cause confusion and difficulties for children with mild and moderate learning handicaps.

Children with learning problems experience three kinds of difficulties with spelling books. First, the directions and exercises may be hard for children to read, decreasing their ability to work independently. Spelling books also include a variety of tasks and directions which change repeatedly. The rapid change of stimuli may confuse children and increase demands on the teacher to repeat and clarify instructions. Third, and most important, spelling texts are neither criterion-referenced nor individualized. Some children become bored and inattentive because they are assigned words and tasks which they already know. Other children require further practice or instructional strategies in addition to those found in spellers in order to learn how to spell words consistently and complete other exercises correctly.

Program slicing. Spelling books can be modified and rearranged to overcome their drawbacks for children. One way to accomplish this objective is called "program slicing" (Hansen, 1973). Program slicing is a method of breaking down a very generalized textbook or broad skill

area into smaller units or steps. After a program has been sliced into finer skill areas or tasks and behavioral objectives are written, the program can be given to students in an arrangement designed to meet their needs. Spelling and language arts are taught in structured, sequential, criterion-referenced formats which use the same procedures daily to facilitate growth in each skill. Directions and tasks are eliminated or modified to reduce the reading load. Finally, instruction is provided only for unknown words rather than for every spelling word found in a book.

Selection of words. There is no one group of critical words to learn or any essential method for ordering lists of words. Words may be selected from the following sources: standard spelling books; words a child uses in his writing; words found in the student's reader; basic "life" words such as a student's name or address; words a child wishes to learn; words excerpted from word frequency lists (Carroll, Davies, & Richman, 1971; Thorndyke & Lorge, 1952); or words which illustrate phonics rules the child is currently learning in reading. Any of these methods of selection will result in a large body of spelling words.

Placement

A child's basic prerequisite writing and spelling skills should be assessed before placing him or her in a spelling program. Pertinent data on underlying spelling skills may be obtained on the ASBAK. These skills include knowledge of letter names and sounds and the ability to print.

If the student has the underlying skills, the next step is to develop a pool of words he/she will need to learn. But even those without all the prerequisite skills can be placed: non-writers could receive spelling instruction by using another mode -- for example, learning to spell words orally. However, some knowledge of sound to symbol correspondence is necessary for formal spelling instruction.

Specific placement procedures can be structured or casual. A structured placement method might include assessing a child's ability to spell every word or some proportion of words in a speller. Specific deficit areas would be determined through a precise analysis of the types of errors the child makes on word lists. A diagnostic checklist could be constructed to determine which spelling rules or patterns are troublesome. A series of tape recordings consisting of lists of words could be prepared and each error word noted for instruction.

Criteria for placement within spelling levels could be established. For example, the child would continue in his or her initial (i.e., with a daily assignment of words presented in the order in which they appear in his speller) until he or she meets a specified instructional level (e.g., 75-84% correct) on at least two occasions (McGulgan, 1975). Secondary placement would then be conducted as discussed previously. In this method placement and instruction occur simultaneously. The teacher gives tests until locating a prespecified number of words the child does

not know, then provides instruction on those words. The process is repeated when that pool of unfamiliar words is depleted.

An alternative method of spelling placement would be to survey a child's written work and choose words he/she often misspells. This method of placement has two advantages. First, instruction is on words frequently used by the child and within his written vocabulary. A second advantage is ease in measuring the child's skill generalization -- his appropriate use of spelling words in other contexts. Often the words chosen for inclusion in spellers are infrequently practiced in everyday writing tasks and may not be consistently retained.

Planning Spelling Instruction

No one actually knows how many words are in the English language. Words are added continuously to describe new products and advances in technology. Considering the rapid growth of the English language, it would be impossible to teach every word in the dictionary. Thus any word by word approach to spelling would be less efficient than teaching patterns and rules.

American-English spelling is far more systematic than it appears at first glance. According to Hanna, Hanna, Hodges & Peterson (1971),

Because the American-English spelling system is based upon correspondencies between phonemes and graphemes that are consistent more than 80% of the time, every available means should be used to help the pupil analyze the written code and familiarize himself with certain patterns and generalizations among the set of correspondencies.

Lovitt (1973) found that children quickly learned to apply spelling rules but had difficulty discriminating between appropriate and inappropriate rule applications. In a related study, Lovitt noted that students seldom generalized rules to new words if they were not provided cues. These studies indicate that children seldom become efficient spellers if they are not provided with specific instructions on how and when to use spelling rules and their exceptions.

Fixed vs. flow lists. Fixed lists of words are commonly used to teach spelling. A fixed word list is a set or group of words which is presented and learned as a unit. The list of words may be partially or totally unknown to students. In many classrooms, a different list of words is assigned each week. Words spelled incorrectly on the final test (usually given each Friday) are either ignored or placed on a list to be practiced at the student's convenience. This procedure seldom ensures spelling mastery for all students. An alternate method is have students practice a list of words until they are all spelled correctly on a specified number of trials. For example, a child may practice a list of words daily until he/she is able to spell all the words correctly for one, two, or three perfect tests. Students are allowed to learn words at their own rate.

Fixed lists are simple to use. They may be individualized by pre-recording tapes or language master cards with words each student needs to learn. One drawback of fixed lists is that children do not acquire all spelling words at the same rate. Some words are learned quickly while additional practice is necessary for others. Therefore, a student may spend unnecessary time practicing known words without being continually challenged with new ones.

The flow list concept was developed to counteract the deficiencies of fixed word lists. The term flowing word list refers to the process of dropping words from a pupil's daily study and test word list when the pupil learns them to criterion and adding new words (McGuigan, 1975). Extra teaching is provided for troublesome words but the child does not waste time practicing words already learned. Flow lists provide more success opportunities than fixed word lists. Each day a student's word list is composed of words he/she is learning and words he/she does not know. Therefore, some words may be learned each day. In flow lists, the content, amount of words assigned per day, and practice necessary for proficiency on each word are individualized.

Individualization of spelling programs. Individualizing the content of spelling lists is basic to effective instruction. Although some words seem to be universally troublesome, most words vary in difficulty depending on a child's ability and past experience. For example, we informally analyzed spelling errors of seven intermediate aged boys in the first 100 words of Power to Spell, level 2 (Hanna, et al., 1971); this analysis revealed that students did not have equal difficulty spelling words correctly. A wide range of words were missed by each student (between 18 and 68). In addition, the specific words spelled incorrectly varied considerably; only 26% of the words were troublesome for over half the students. Individual spelling lists composed of each student's difficult words had little in common.

Individualization is also achieved through adjusting the number of trials at criterion to ensure maximum learning and retention. Our experience indicates that some children need to overlearn words in order to retain them. Vergason (1968) demonstrated that practice after a skill is learned causes it to be more resistant to forgetting over extended periods of time. Optimum degrees of overlearning differ. Some children retain words accurately after spelling them correctly only once, while other children require repeated practice to achieve maximum retention. Most children, however, remember words with a high degree of accuracy when they have spelled them correctly for two consecutive days or two out of three days (Hansen, 1975; McGuigan, 1974).

The assignment size can also be individualized. Some children are successful learning standard 10-20 word spelling lists. Other children have difficulty remembering large groups of words and can progress in spelling if the number of words is reduced. For example, Diane, a ten year old girl, rarely spelled words correctly on five-or ten-word lists. However, when presented with only two words to learn at a time, Diane could, over a three day period, spell at least one word correctly on two consecutive days. Two words was a reasonable assignment load for Diane. Reducing the assignment is a viable option to select for children who

fail to progress in spelling. A rule of thumb is to reduce the size of an assignment until the student achieves one success (i.e., spells at least one word correctly) a day. If teachers choose this option, they should attempt to gradually increase the amount of words assigned each day. Once a child begins to feel successful, his capacity for tolerating a greater number of words increases.

The wealth of factors to consider when planning individualized spelling programs should not be overwhelming. Careful planning and organization will ensure smoothly operating, efficient programs which do not require excessive teacher time. Many short cuts can be devised to ensure that children are working at their own level and at their own speed. For example, language masters or tape recorders can be used to administer spelling words. Each student's pool of unknown words could be numbered so that students could test each other by referring to a coding system. Students themselves can take responsibility for selecting, administering and refiling their words each day. Finally, children can be taught to correct and record their own spelling performance.

Self-correction. Allowing students to correct their own work appears to be both economical and educational. Hansen and Lovitt (1974) found that self-correction facilitated acquisition of unknown words without a loss in retention. Six students aged 9-11 participated in the study. Students learned eight spelling lists, each composed of ten previously unknown words.

Half of each student's word lists were self-corrected, while alternate lists were corrected by the teacher. The instructional procedures were the same for all lists. A student practiced each list of words daily until obtaining a score of 100% for two out of three trials. Retention was measured by assigning each list once a week for five weeks after the pupil had learned it to criterion.

Teacher- and student-corrected lists were compared in terms of average number of days to criterion and average percent correct retention. Table 1 depicts the results of the study. All students completed self-corrected spelling lists in fewer days than they spent on teacher-corrected lists. Students learned teacher-corrected lists to criterion in an average of 7.8 days, and self-correcting lists in an average of 5.2 days. Average retention on self-corrected lists was similar to average retention on teacher-corrected lists. Four of the six students' retention was equal or superior on self-corrected lists to retention on teacher-corrected lists.

Insert Table 1 about here

The success of self-correction as a learning tactic may be related to three factors. First, students may feel more personally involved with their own learning when they correct their work. Second, the immediacy of feedback during self-correction may influence learning. Feedback on spelling performance usually occurs later in the day when

the teacher corrects papers, but in self-correction, students are able to correct their work immediately. Finally, the discrimination involved in correcting one's spelling may result in closer attention to misspellings.

A few cautions should be noted. In order to remove the temptation to change words after a spelling test, self-correction should be conducted away from a student's desk, in view of the teacher, and with colored pens.

Teaching Spelling

Tactics for improving children's ability to spell accurately can be grouped into three categories: instruction, contingencies for errors, and reinforcers. Instruction includes cueing children to attend to specific parts of words, or teaching them ways to study such as cover-copy-compare. In contingencies for errors, one stipulates that each incorrectly spelled word is drilled for a specified number of times or a specified time. Reinforcement includes the student's earning activities or the teacher's giving praise and attention to improved spelling performance.

Instruction. Direct instruction is the basic weapon in the teacher's arsenal. For example, a simple cueing procedure was sufficient to remediate 10-year old Paul's reversal problems (Smith & Lovitt, 1973). This young man often reversed the letters b and d in his written work. A word dam. He was asked to read the word, name the first letter, and write the word. Next, he was shown the word bam and the procedure was repeated. After this teaching period, which lasted about 45 seconds, Paul was informed that he often wrote dam when he heard the word "bam." He was then asked to spell a list of three letter words with b and d in different positions. The effects of the cueing procedure were noted immediately. Within five days Paul's accuracy for all words tested was 100%. Subsequent analyses of Paul's penmanship papers revealed that he transferred his discrimination of b's and d's appropriately and seldom reversed them. Apparently, Paul had little difficulty in spelling but had not previously discriminated consistently between b and d.

A single technique is sufficient for enabling many children to learn how to spell accurately; however, alternate tactics should be available for children who have difficulty learning and retaining spelling words. A sequence of four teaching tactics has been developed for use in the curriculum research classroom (Hansen, 1974b). These tactics include: cover-copy-compare, write each error ten times, pre-practice on the language master, and write each error word 50 times.

The effectiveness of these tactics was compared for seven students enrolled during the 1974-75 school year. A total of 53 lists of words were completed (ten words per list). Cover-copy-compare was the first tactic used for every student. It consists of these four steps: first, the student analyzes a word and notes its distinctive features; then, he or she writes the word while saying each letter silently; next, he/she covers the word and writes it once again from memory; finally, the

student compares the written word to the original to see if it is spelled correctly. The pupil repeats the process until he/she spells each word correctly without referring to the model. The cover-copy-compare method alone was sufficient for learning to criterion nearly two-thirds of all spelling lists.

Contingencies for errors. Students who failed to achieve mastery on some spelling lists with the cover-copy-compare method (or failed to progress quickly) were next assigned to write each error word ten times. This combination of techniques -- cover-copy-compare and writing the error word ten times -- was responsible for the mastery of 88% of all lists. The third tactic (pre-practice on language master) and fourth tactic (write each incorrectly spelled word 50 times) were seldom used. In only 11.3% of spelling lists these tactics were employed. Language master pre-practice consists of listening to each word spelled on a language master card and writing the word on a practice page prior to the daily spelling test. The final tactic is self-explanatory.

Reinforcement. Several studies provide ample evidence that when a reinforcer is found, such as teacher attention, peer consequences, leisure time, or recess, and when the reinforcer is arranged contingent on spelling words correctly, accuracy will improve. For example, Zimmerman and Zimmerman (1962) demonstrated that when a teacher attended to only correctly spelled words, the spelling accuracy of an eleven-year-old boy improved. Evans and Oswalt (1968) provided evidence that a group consequence was effective in increasing the spelling accuracy of two fourth grade students. In 1969, Lovitt, Guppy, and Blattner arranged a free-time contingency that affected the quality of spelling performance of a group of sixth-grade pupils. Finally, Karracker (1971) illustrated how a recess contingency increased the spelling accuracy of a fifth grade boy.

Decision rules. Instructional tactics are retained when students' progress is satisfactory. After each three-day period data are analyzed and decision made to continue a tactic or change to a new one. Instruction continues until a student is able to spell the entire list of ten words correctly for two out of three days.

The decision rules for retaining or changing teaching tactics are based on previous students' progress in spelling. The rules vary depending on the number of days a student spends learning a list of words. The mean of the first three days of instruction must be at least 56% correct or else a second tactic is introduced. The mean of the second three days after an intervention must be at least 90% correct or the tactic is changed. Finally, mastery must be met after nine days of an intervention or a change is made. The reader is referred to chapter 7 for additional information on decision rules.

This set of rules was compared to an alternate decision rule system for spelling. In the alternate method a tactic was retained as long as students attained 30% proportional growth in each three-day period. Students mastered word lists in an average of 10.7 days when the 30% rule was followed, while the variable criteria resulted in an average time to mastery of only 6.1 days. Children's retention of correct

spelling was similar under both rule systems. Therefore, the variable criteria rule is suggested for use in making change decisions in spelling because words appear to be learned in less time without loss in retention.

Figure 3 illustrates the decision making process for Vance (age 10) while he was learning two spelling lists. Baseline for each list consisted of locating ten words from Power to Spell, level 2 (Hanna, Hanna, Hodges & Peterson, 1971) which Vance spelled incorrectly three times. These words were tape recorded in three different orders for daily testing. Next, Vance was requested to cover-copy-compare each word he spelled incorrectly on daily testing.

Insert Figure 3 about here

The top chart on figure 3 shows Vance's progress on list A. After three days of instruction, Vance spelled 47% of his list correctly. But his progress was less than desired; therefore, a second tactic was introduced. Vance continued to be tested on the ten words each day; however, he was asked to write each incorrectly spelled word ten times using the cover-copy-compare method. This tactic remained in effect for the following six days. The mean of the first three days of this intervention was 90%, well above the necessary level of performance. Vance's progress during the next three-day period was minimal; therefore, pre-practice on the language master was assigned. Pre-practice lasted only one day because Vance met the criterion for mastery (two out of three days at 100%). This list of words was then placed on a maintenance schedule and Vance was assigned the words once a week for the next five weeks.

A new set of words was then chosen for instruction in the manner described previously. Vance learned this list of words (List B) by using cover-copy-compare only. An analysis of the maintenance data for both spelling lists showed that Vance's retention was the same for both sets of words.

Student choice. Instructional tactics were chosen by the teacher. Students had no voice in deciding which method they preferred or which method might be most effective. In early 1975, a study was conducted in the curriculum research classroom to compare spelling performance when students were allowed to choose their own tactics for learning words with the sequence of teacher-determined tactics described earlier (Hansen, 1975b). Six students completed four lists of spelling words (24 total lists). On half of their lists, students were allowed to chose their own teaching tactics; the teacher applied techniques in the manner described previously on the remaining lists. Table 2 shows each student's first choice of tactics and the number and percent of time each tactic was effective in allowing him to master a list without resorting to additional learning methods. The two tactics most frequently chosen by the students were: a) taking spelling words home to

study, and b) pre-practicing words on the language master. Both tactics were reasonably effective (62% successful). Three other tactics were also chosen by students: cover-copy-compare, write errors ten times, and self-correction of the test. In all, students passed 67% of their lists with only one tactic during self-selection, compared to 75% of lists passed with only one technique (cover-copy-compare) during teacher selection. These data suggest that students can often select effective ways to learn spelling words.

Insert Table 2 about here

Add-a-word. Strategies described for teaching spelling have used fixed word lists. As stated previously, fixed word lists have disadvantages. Procedures for teaching spelling using a flow word list have been developed by McGuigan (1975). In the "Add-A-Word Program," as each word is learned to criterion (two consecutive days correct) it is dropped from the teaching list and a yet unpracticed word is added. Teaching tactics may be chosen from the suggestions discussed previously. Records are kept of the cumulative number of words passed. Measures of retention are obtained by choosing a number of words at random from the set of learned words for the student to spell each week.

The Add-A-Word Program has been used successfully at the Experimental Education Unit with over thirty children ages 7 to 13 and in many public school classrooms, including adult re-education programs. Data from these children and adults indicate that they learn words more quickly with add-a-word lists and have similar or even superior retention than with fixed word lists.

Maintenance. The desired goal in spelling is for pupils to remember how to spell words once instruction is discontinued. Frequent maintenance checks on retention of learned spelling words should be systematically planned. One method would be to schedule completed lists for re-testing once a week for five weeks, then once every other week for ten weeks, and finally, once every five weeks. A second way to schedule maintenance checks would be to select a sample of learned words at random to test each week. Words which are spelled incorrectly on maintenance checks should be retaught.

Summary

Spelling instruction is most efficient when it is individualized in content, amount, and time. Individualization ensures that each student learns words which are troublesome for him/her and is allowed sufficient practice to master each new word.

Teachers must plan for and encourage children to utilize newly acquired spelling skills. Children should spell correctly and independently when writing stories, reports, and other assignments. In the

real world, unfortunately, children do not always automatically practice accurate spelling. They sometimes fail to generalize from the spelling period to using sound-symbol correspondences when writing in context.

One way to promote transfer of spelling skills is to pair students and have them dictate sentences for each other to write. In one classroom, for example, students alternately dictated for two minutes from a linguistic reader (SRA Basic Reading Series, 1964). Students then checked and re-corrected misspelled words. New phonetic elements were introduced after a student achieved 100% correct spelling on a story. This procedure was helpful in showing pupils that accurate spelling was important when writing in context.

Continuing research needs. Three components of an effective spelling program appear to be: a) teaching rules, b) cueing generalization of rules, and c) teaching discriminations or exceptions to rules. Research on strategies for developing such a program is limited. We need to learn effective ways to teach children word analysis and spelling patterns in order to facilitate transfer, generalization, and discrimination in writing. Thus far very little is known about how to change children's habitual spelling patterns to conform to standard spelling conventions. We also don't know why some children retain well while others' ability to spell deteriorates over time.

Children who continually experience difficulty in spelling words with regular patterns may suffer from poorly developed sound symbol correspondences, poor memory, or an inability to break words into morphemes for analysis. These children may require different remediation strategies than do children who can spell regular words but are unable to spell irregular words. Intensive research into these questions will result in more powerful methods of spelling instruction.

Writing in Context

When two words are joined together to express an idea, true written communication emerges. Legibility of handwriting and accurate spelling enhance such communication; however, the primary emphasis changes to organization of ideas and mechanics of writing.

Unfortunately, educators do not appear to be skilled at developing effective writers. A recent nationwide survey of persons from those in early elementary grades through young adults concluded, "Young Americans' mastery of the form and mechanics of written English ranges from adequate to almost nil" (Seattle Times, 1972). This survey, conducted by the National Assessment of Educational Progress, revealed that nine-year-olds have almost no command of the basic mechanics of grammar, syntax, vocabulary, spelling, sentence structure, and punctuation. A concentrated effort to improve the ability of all students to write in context is definitely needed.

Our inability to provide effective instruction in writing may stem from a lack of consensus among practitioners and researchers on the writing process. Evaluation of students' writing abilities is less refined than evaluation of other subject areas such as spelling or penmanship. There is little agreement on the progression of skills to be developed to produce proficient writers. There is even less agreement on what components should be analyzed and how to measure improvement in students' written work.

Writing is more complex than merely placing spoken words on paper. The writer must organize his/her ideas logically and follow proper mechanics and writing conventions in order to produce clear, precise communication. In contrast to oral communication where "fuzzy" thoughts may be clarified through the interaction of speaker and listener, in written communication the writer must be able to clearly express his ideas for an unknown, usually unseen audience. Thus, clarity and accuracy of communication are crucial skills to develop. The mechanics of writing -- including punctuation and capitalization -- are also important components of writing. Periods and commas replace the pauses and inflections used in oral communication to emphasize points and mark the beginning and end of thoughts. Improper or non-existent punctuation may result in miscommunication. These skills are developed through continued practice, instruction, and feedback.

In this section, discussion will focus on four areas of interest: 1) kinds of writing tasks, 2) ways to measure writing skills, 3) guidelines for instruction, and 4) suggestions for evaluation.

What To Write About

Initial writing experiences may be vicarious; that is, while the child composes the material, he or she dictates a story to the teacher who will write and later read it. Early writing experiences include composing one or two related sentences. Later, students write paragraphs and stories while the instruction they receive emphasizes organization of ideas and proper mechanics.

The question of what to write is limited only by the creativity of the teacher and interest of students. Children enjoy writing stories about pictures or intriguing titles. "Story starters" or unfinished stories provide opportunities to think divergently. Students make up their own stories or relate personal experiences. Some excellent books are available which list many different writing assignments including: Slithery Snakes and Other Aids to Children's Writing (Patty & Bowen, 1967); Writing Aids Through the Grades (Carlson, 1970); and Sparkling Words: Two Hundred Practical and Creative Writing Ideas (Carlson, 1965).

Opportunities for writing take many forms. The National Council of Teachers of English (1963) suggests eight kinds of functional written language experiences which occur either in school or adult life.

1. Writing directions, announcements, and minutes of a meeting.

2. Writing reports about articles or stories.
3. Summarizing data from reading, oral and written reports, and class discussions.
4. Communicating personal experiences.
5. Writing imaginative compositions.
6. Writing letters for social and business purposes.
7. Writing for the school magazine or newspaper.
8. Writing which requires special competencies in the organization and development of ideas.

These writing activities should be planned throughout a child's school career. However, the emphasis in this chapter will be on more basic aspects of writing, such as writing sentences and paragraphs and developing the ability to use the mechanics of writing. These skills will be discussed as they relate to creative writing activities. Creative writing is defined as all material written by children which is not copied or repeated from memory.

Measures of Writing

Ideas about how to measure writing are as numerous as suggestions for writing activities. No set of standards exists to define or measure "good" writing. Vocabulary and length of sentences are the most widely used measures of performance; however, many other variables are reported. Objective measures of writing include total number of words written, number of different words or new words used, or the level of abstraction of the vocabulary. Mechanics such as spelling, grammar, capitalization and punctuation are often measured.

Qualitative aspects of writing may be measured by considering the number, value, and originality of ideas. Taylor & Hoedt (1966) suggest a rating scale for judging quality which considers originality, humor, depth of feeling, sensory content, plot, and word choice. Originality is rated by Carlson (1965) in terms of story structure, novelty, emotion, individuality, and writing style.

It would be impractical to measure all these components daily. Normally a teacher will first carefully analyze samples of children's written work to set goals for instruction. Then he/she will frequently measure those aspects of writing which provide useful information on progress towards established objectives.

Three components of students' performance should be analyzed: mechanics, organization, and quality or originality of ideas. The mechanics analysis includes determining whether a student writes complete sentences and run-on sentences, uses correct punctuation and capitalization, and makes effective use of nouns, adjectives, adverbs,

etc. Organizational aspects of writing such as the ability to write paragraphs with topic sentences and supporting sentences or the ability to organize stories and include a beginning, middle, and end are analyzed. Finally, a measure of quality is obtained using instruments such as those suggested previously. The analysis of a student's strengths and deficits in all three areas will guide the teacher in establishing goals for instruction.

Instruction

Kraus (1959) lists five conditions likely to facilitate improvement in writing: (1) Pupils must be given frequent opportunities to write. (2) Instruction should focus on the sentence structure errors on which pupils need most help. (3) Opportunities for individualized instruction should be emphasized. (4) Pupils should assume initiative and responsibility for self-instruction. (5) Pupils should be taught to apply principles of good writing in correcting and improving their own work. We would suggest one further activity for developing effective communicators: namely, that children be encouraged to share and discuss their stories.

Any skill improves only through continued practice. Daily creative writing periods will provide many opportunities for written expression. Assignments may be completed in a day or continue for a week or more. However, merely providing frequent opportunities to write will not ensure improvement in writing ability. Instruction to improve children's writing may take two forms. First, pre-writing cues to attend to different aspects of writing, such as mechanics or organization, may aid writing. A second type of instruction is through feedback and re-writing of completed stories. Instruction through feedback provides an opportunity to develop skills in meaningful situations and as particular needs arise.

One area of confusion in writing instruction is whether children's work should be praised or criticized. Taylor & Hoedt (1966) studied the effects of praise and criticism on the quality and quantity of themes produced by fourth grade students and upon the children's attitudes toward creative writing. Pupils in three classrooms received ten lessons in creative writing, one a week for ten weeks. The teachers placed written comments on the papers before they were returned. Group A received comments of praise: the best parts of each paper were circled and no errors were marked. Group B received no praise, only comments designed to encourage better writing: all errors were circled in red. The number and quality of comments received by each group were equal.

Two general findings were reported in this study. First, group A and B did not differ from each other significantly in quality of themes or numbers of highly creative themes produced. Second, the groups did differ significantly on the quantity of words produced, overt behaviors, and attitudes. The group receiving praise wrote more words per lesson and had significantly more favorable responses toward the experience than did the group receiving criticism. The authors concluded that praise was more effective than criticism in increasing the amount of words produced and promoting favorable attitudes toward writing.

The Taylor & Hoedt study suggests that praise is an effective way to increase children's writing. However, praise alone would probably be insufficient for children who have not mastered rudimentary writing skills. These children require some type of instruction in order to learn basic mechanics and organization in writing. Some combination of praise and constructive criticism would be most efficacious when children are learning how to write.

A second area of controversy is whether instruction and feedback should concentrate on mechanics or quality of writing. Itten (1964) suggests that "every correction in an essay has an offensive effect which destroys a child's natural story telling." Staudacher (1968) presents a less extreme view, stating, "at all times the teacher must remember to give more emphasis, attention, and praise to the creative ideas expressed by the child than to grammatical or technical difficulties in the child's writing". While Shane & Mulry (1963) contend that "mechanics should be explained as needed and children should be convinced of their importance and encouraged to use them again and again in meaningful ways until their use becomes second nature." The latter view towards the controversy between content and mechanics is perhaps most useful in helping children learn how to write better.

Feedback. The effect of feedback on mechanics or content was studied at the Experimental Education Unit by Hansen & Lovitt (1973a). In this study, the creative writing of seven boys aged 9-11 was compared over a period of ten weeks. An AB design was used. Throughout the baseline no teaching, feedback, or reinforcement was scheduled.

Daily, the pupils wrote for 10 minutes. Three different stimuli for writing were used each week. On two days the stimulus was a story starter. A portion of a story was read to the pupils and they supplied the ending. Twice a week, story titles were presented. On one day, generally Friday, the students were free to write about a topic of their choice.

Six elements of writing were measured daily: total words written, number of words per sentence, the proportion of different words to total words, percent correct usage of punctuation and capitalization, and a quality measure. The first five measures were objectively obtained. The quality of stories was rated by two independent judges using the quality evaluation scale developed by Taylor and Hoedt (1966). Agreement in judging the quality of the stories throughout the study was quite high (98%).

During the next phase, two types of feedback were provided. Feedback was on mechanics for one group, while feedback only pertained to content for the other group. Six statements were provided each pupil on every story. Three of the statements were positive and three were negative. With the mechanics group, the teacher pointed out three places where a pupil had correctly used punctuation or capitalization and called to his or her attention three places that could be improved. With the content group, three positive and three negative statements were offered relating to style, syntax, and description.

Following this condition of partial feedback, a "total" feedback phase was instituted. At this time the pupils were given feedback on several details pertaining to either content or mechanics.

Comparisons were made between the baseline condition and the combination of the feedback conditions. Both groups improved in their use of punctuation and capitals; however, greater improvement was noted for the group where feedback was on mechanics. The words-per-minute rates of the students remained the same throughout the study. Both average sentence length and the use of different words increased for most pupils' irrespective of the focus of the intervention. Finally, both groups showed about the same amount of improvement on the content or quality measure.

When the degrees of feedback were compared -- partial vs. total -- the differences between groups were mixed. For some pupils, certain aspects of writing improved more during the partial feedback condition; for some other pupils, writing improved more during the total feedback condition. Although both the content and mechanics of the groups' writing were beneficially influenced by feedback, neither group became proficient in either respect. Apparently other interventions, such as modeling or reinforcement contingencies, are required to complete the task.

Of some interest was the fact that placing an emphasis only on mechanics did not have an adverse effect on the amount or quality of the students' writing. On the contrary, feedback on mechanics was more effective than feedback on content in positively influencing both mechanics and content.

Reinforcement. Reinforcement can also be used to improve writing performance. Brigham, Graubard and Stans (1972) applied sequential reinforcement contingencies on three components of composition: total number of words, number of different words, and number of new words. Thirteen boys from a fifth grade adjustment class were included in the study. A multiple baseline design was used in which the class was divided into three groups on the basis of writing ability. The experimental manipulations consisted of a series of contingencies arranged for all children in the following order: 1) during baseline: points were contingent on general work behaviors. After baseline: 2) points given for number of words, 3) points given for different words, and 4) points given for new words. The contingencies were introduced at different times for each group. The points earned by each student were exchanged later for privileges in the room, such as working on arts and crafts projects.

Overall writing performance improved most in the number-of-words condition. The different-words and new-words contingencies had little effect on performance. In terms of the quality rating scores, the new-words condition resulted in the highest quality ratings of the study. These results indicate that reinforcement may be effective in increasing students' word output and modifying the kinds of words included in written assignments.

Editing. Instruction in editing and re-writing seems to be useful in developing better writers. Most children (and adults) express displeasure when asked to edit and re-write a composition. However, all good writers observe these practices. According to Murray, "... writing is basically a self taught skill produced mainly by rewriting, and ... the teacher's primary role must be to guide the youngster through this difficult act of self-teaching" (1968, p. 222).

Criticizing and improving one's writing is an important instructional device when it occurs in a non-threatening atmosphere. Editing can be accomplished in individual conferences or group discussions (if anonymity is preserved). One suggestion for constructive editing is to have the student read his/her story aloud to the teacher so that he/she can recognize inconsistencies. The initial reading should emphasize strengths of content and organization. Mechanics can be taught on an individual basis by aiding the student to determine where each sentence ends, and showing him/her how to use correct punctuation and capitalization. Misspellings of words can be corrected by having the student use his/her knowledge of phoneme-grapheme correspondences to sound out words. Finally, suggestions for "spicing up" a story may be provided by indicating places where adjectives and expanded phrases will help to liven up the writing. Finding time for such in-depth conferences is a problem. Usually, if students know that each one will have uninterrupted editing time with the teacher, they will respect the rights of others. Alternate activities could be planned for students waiting for conferences.

Sharing. The goal of writing is to communicate one's thoughts to others. Sharing stories with the class can be exciting and educational. First, sharing stories provides practice in oral reading. Children enjoy giving dramatic renditions (often including sound effects) of their stories. Second, sharing stories gives students feedback on their writing style and organization. As they read, students may realize they omitted words, phrases, or even parts of stories. Reading one's own work (or a neighbor's) emphasizes the value of legible penmanship and correct spelling. Third, the interchange of ideas through the sharing of stories can provide models for other students to follow in improving or judging their own writing. Fourth, sharing stories can serve as a powerful reinforcer which will encourage children to improve both quality and quantity of writing. Sharing stories should be a positive experience in which strengths are praised. Praise should be on specific aspects of the story which are especially well conceived. Finally, praise and suggestions may emanate from teachers and students. Children need to gain experience in constructive criticism of others' work.

Summary of Instruction. Suggestions for writing instruction may be briefly summarized. First, varied writing activities should be planned. Curriculum guides, practical idea books, and journal articles provide valuable sources for writing assignments. Each of these activities should emphasize different kinds of writing such as descriptions, expository writing, narratives; and different skills such as expanding ideas or vocabulary building. Prior to actual writing, the assignment

should be discussed and cues provided to aid students in organization, developing ideas, and proper usage of mechanics. Second, a block of time for daily writing periods should be set aside. Writing skills only improve through practice. Third, instruction can be individualized through editing and re-writing. Students should be taught how to evaluate and revise their own stories. Mechanics should be introduced as needed. Correct punctuation and capitalization should be practiced in daily writing activities so they are used automatically. Feedback appears to be an important component of developing clear, effective writers. Feedback should include both praise and criticism. During conferences attention should be given to ideas, organization, and mechanics. Finally, students should be encouraged to share their stories with others.

Evaluation

As stated previously, the measurement of change in writing depends on goals. If the goal is to increase the quantity of writing, then count the total number of words. If the goal is to improve appropriate use of punctuation and capitalization, then count those behaviors. Alternatively, if quality or originality is the goal, a rating scale or idea count could be used.

Some behaviors -- such as the number of words or sentences written or the correct use of punctuation and capitalization -- may be measured daily. Ratings of organizational abilities and quality of stories are usually obtained on completed products. Daily measurement is more sensitive to changes in writing performance but may not be feasible in a large classroom. Therefore, periodic detailed analyses of students' written assignments may be more functional and manageable.

Writing is a fluid skill which is difficult and time-consuming to break down into small components; therefore, a cluster analysis -- analysis of a group of related skills -- may be most appropriate for evaluation. For example, a cluster analysis or checklist may ask whether the story has a beginning, middle, and end or whether punctuation is used appropriately. A cluster analysis has two functions. First, it is used by the student as a reminder to plan and include various components in his/her writing. Second, it is used by the teacher to evaluate students' progress in writing.

Summary

The ability to organize thoughts and communicate logically and creatively to others is a skill which continues to be developed and refined throughout our lives. It is a fluid skill which is not easily compartmentalized into simple quantifiable behaviors.

Measurement and evaluation of writing ability continue to be sources of confusion and controversy. There is no consensus on the definition of "good" writing, even though subjectively many persons

would agree that some writing and writers are better than others. One partial solution to this dilemma is to set goals based upon a child's writing performance, then measure those aspects of writing which provide information on goal attainment.

Meaningful writing begins when a child joins two words to express an idea. Prior to formal instruction, children can discuss stories orally and dictate to others. Encouragement and praise combined with a limited emphasis on organization or mechanics are provided for beginning writers. Later, cues, feedback, editing, re-writing, and self-evaluation are used to mold and improve writing skills. These strategies are not used merely by teachers to teach writing; they should be adopted by students to improve their own work. As James A. Michener observed, "I have never thought of myself as a good writer . . . but I'm one of the world's great rewriters." (In Murray, 1968, p. 241).

The goal of any instructional strategy should be to show children that writing is meaningful and useful. Learning to express ideas well is not an easy task. Children who master the basic mechanics of grammar, syntax, vocabulary, sentence structure, and punctuation early, and who are trained to critically evaluate and edit their stories, experience the exhilaration of taking an idea and developing it to the best of their ability. The teacher's role in writing instruction is to guide and direct students' talents in meaningful situations. Instruction should provide a balance between appreciation and enthusiasm for a student's ideas and a dedication to improving the presentation and organization of those concepts.

General Summary

According to Murray (1968), "The writer dreams of art, but he works at craft" (p. 13). In this chapter, three writing skills have been discussed: penmanship, spelling, and writing in context. Combined, these skills contribute to the "craft" of composition, hence to better and more lucid writers.

Penmanship is a basic skill which many children begin acquiring even before they enter school. Legibility in handwriting is due to: sufficient motor coordination, instruction in letter formation, and proper motivation. Sloppiness is acceptable when one writes personal notes; however, neatness becomes important when others will be expected to read one's writing. Fluency or speed of writing is important for two reasons. First, it is a measure of automaticity. A skill which is performed quickly becomes habitual and automatic, thus freeing the writer to concentrate on the message rather than mechanics of letter formation. The second reason for building fluency is more subtle. Often, children labeled as slow learners are actually only slow workers. These children turn in incomplete or late assignments because they write much more slowly than other children do. By learning to write quickly and legibly, they have a better chance to complete assignments in a reasonable amount of time.

Accurate spelling is considered a measure of literacy in our culture. Most children are really very good spellers. They sound out words diligently and spell them according to their own unique orthography. The problem is not to teach children how to spell, but to teach them to spell using standard rules and patterns of the American-English system. The word by word approach to teaching spelling is less effective than teaching rules and patterns. The crucial element of any spelling program is to teach children when to generalize known rules to similar words and how to discriminate between usual and unusual spellings. To date, very little research has focussed on strategies for meeting this goal. Future investigations should be undertaken to determine how to facilitate generalization, discrimination, and application of rules and patterns in spelling.

Our goal in writing instruction is not to produce novelists or poets (although that would be great), but to develop in persons the ability to use writing skills in daily life. Functional writing tasks in an adult world are varied. They include filling out shopping lists, writing to senators, and completing employment or even welfare forms. In general, teachers have stressed the mechanics of writing at the expense of developing children's ability to write divergently or think creatively. These latter skills represent general communication processes which should be emphasized in all subject areas. Our research has indicated that creativity and originality in writing are not impaired when instruction concentrates on the mechanics of written expression. On the contrary, children who learn to use punctuation, correct grammar, and logical organization are more likely to become better writers. Divergent thinking and creative writing are the result of writing - rewriting and rewriting.

The intent in this chapter has been to provide suggestions for individualizing instruction in writing based upon students' performance and needs. Individualized programs can include different words or tasks, criteria of proficiency, assignment sizes, and teaching tactics. Through careful planning, diagnosis, and frequent measurement of students' skills by teachers, children can learn to use the written mode with increasing expertise.

TABLE 1

Average days to criterion and percent retention during Teacher-correction vs. Self-correction of spelling lists

Name	DAYS		% RETENTION	
	T*	S*	T	S
VC	7.8	7.0	92.3	87.7
CC	9.0	5.5	90.0	90.0
HG	10.3	5.0	87.0	90.7
DM	7.5	4.3	90.0	93.3
CM	5.8	5.0	93.7	89.0
MS	6.3	4.5	91.7	92.7
N=6	7.8	5.2	90.8	90.6

*T = combined teacher corrected lists

*S = combined student corrected lists

Table 2

Spelling - Students' First Choices of Tactics
and their Effectiveness (Spring, 1975)

<u>Tactic</u>	<u>Times Chosen</u>	<u>Times Effective</u>	<u>% Effective</u>
<u>Students' choice</u>			
Take Home Words	4	2	50
Language Master	4	3	75
Cover-Copy-Compare	2	1	50
Write Errors 10 Times	1	1	100
Self-Correct	1	1	100
TOTAL	12	8	67
<u>Teacher-Assigned</u>			
Cover-Copy-Compare	12	9	75

print
each
letter

c h m g d j r o e k s a p

m u f i w t x b y n r g z l

write
each
letter
cursive

a b c d e f g h i j k l m

n o p q r s t u v w x y z

write 2
letters
cursive

or wi br ve um ko ya qu cl du

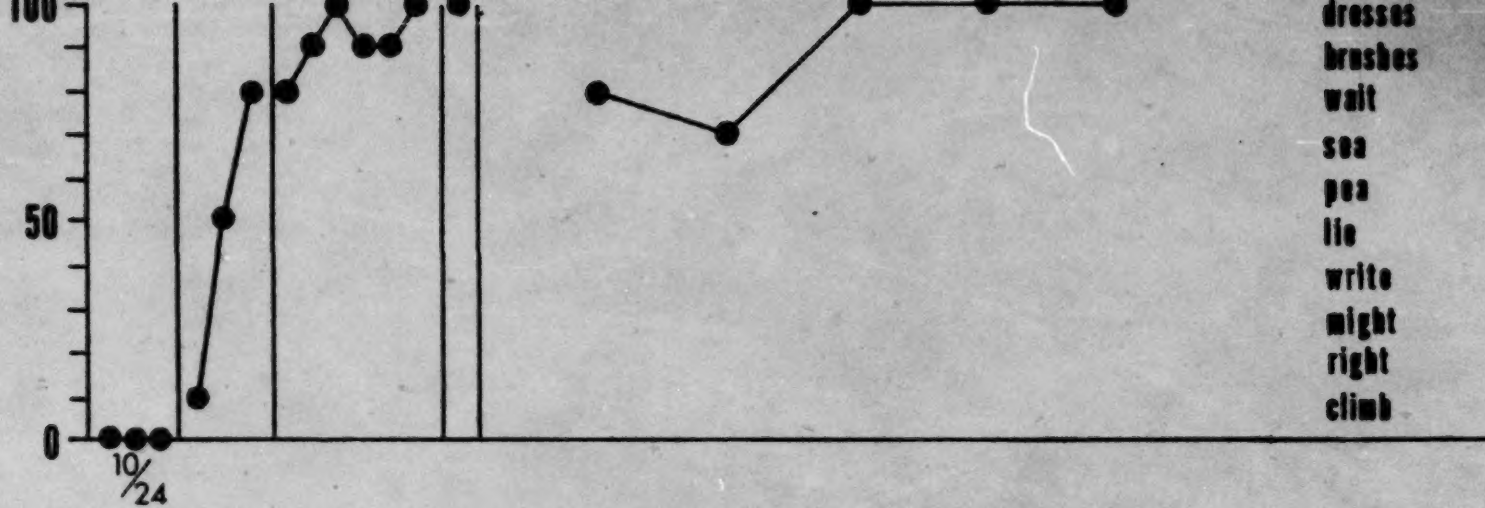
fe gr bo ja nm pi se tw xi zo

write
cursive
capitals

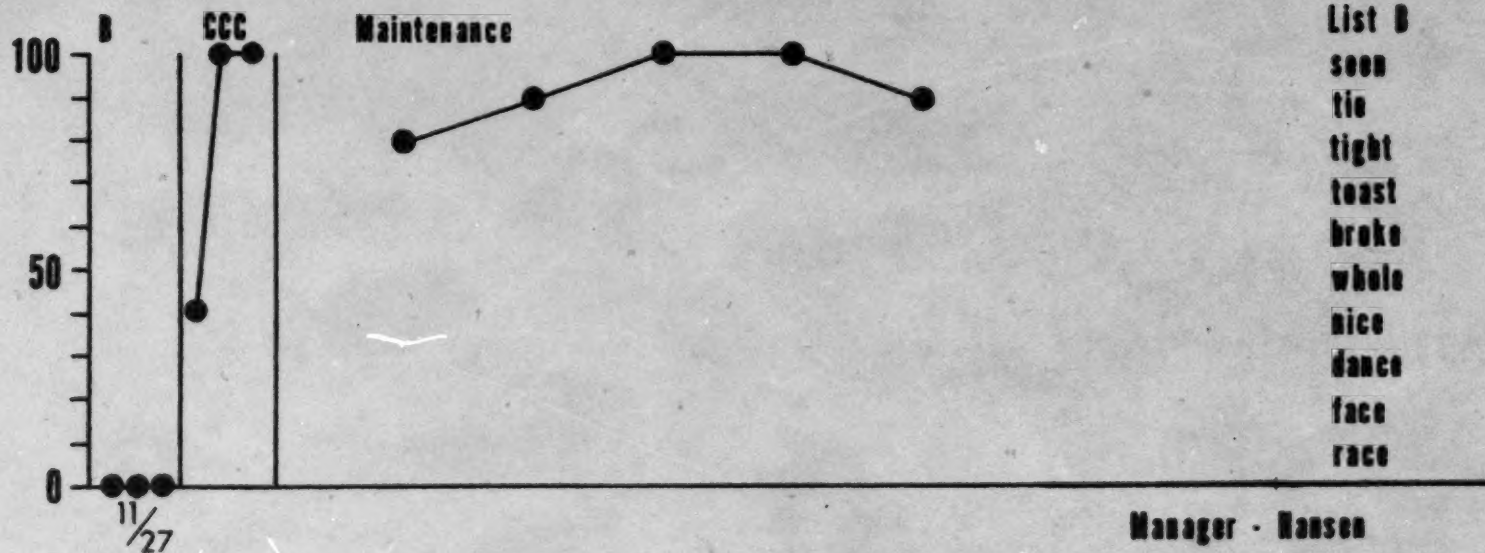
A B C D E F G H I J K L M

N O P Q R S T U V W X Y Z

Percent Correctly Spelled Words



dresses
brushes
wait
sea
pea
lie
write
might
right
climb



List B
soon
tie
tight
toast
broke
whole
nice
dance
face
race

Manager - Hansen

Subject - Vance

10 years

1974

Figure 3

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CHAPTER 5

ARITHMETIC

Introduction

The focus of this chapter is on the basic arithmetic processes: addition, subtraction, multiplication, and division. Also contained in this chapter is some discussion about certain types of "story problems."

Several topics which are treated in elementary school arithmetic books are not dealt with in this chapter, such as the concepts of greater than-less than, sets and unions, measurements, time, and fractions. It is our belief, however, that although these topics are not discussed in this chapter, many of the methodological features of the Applied Behavior Analysis (ABA) system used here with the basic elements of arithmetic would apply in teaching those skills.

The intent of this chapter is to give elementary school teachers, particularly teachers of children who are lacking in the basic arithmetic skills, a rather complete teaching strategy. Suggestions are offered for assessing the competencies of students in various arithmetic areas, how to place them at various performance levels, how to determine behavioral objectives, how to arrange instructional settings, and how to select appropriate instructional techniques.

In addition to these rather presumptuous objectives -- that of presenting a total approach to the instruction of basic skills -- an attempt is made throughout this chapter to offer an instructional method that is inexpensive, accessible, easily learned, and, of course, effective.

It has been my belief for some time that the business of education has become very complex and expensive. Unfortunately, the development of children has not always paralleled this sophisticated growth. In fact, it seems to be the contrary: as the business of education has grown and become more extravagant, the abilities of pupils to perform basic tasks have deteriorated. This ineptness in regard to the basic skills -- specifically the arithmetic facts -- has been proclaimed by several critics.

The ABA system, the basis for the research discussed here and advocated for teachers in their instructional efforts, does not necessarily require the involvement of expensive buildings, materials, or instructional systems. To the contrary, since the ABA methodology is a scientific approach and is concerned with the precise evaluation of variables, it is necessary that those variables and the conditions under which they are evaluated be explained. This being the case, when the ABA methodology is used, all the aspects of instruction are simple. The materials that are used for instruction are simple. The instructional techniques are uncomplicated. Further, the methods for analyzing the data in respect to pupil progress are uncluttered.

These simple features are quite a contrast to some traditional approaches. Other systems, even though they advocate that data be obtained in regard to the performance of children, offer methods for gathering and analyzing data that only a select group of highly trained specialists could use. Likewise, when it comes to materials and techniques, there are many expensive and sophisticated systems that are available. Only the most affluent schools can possibly afford some of the apparatus sold for educational purposes. Moreover, some of the instructional techniques that are touted require people to spend great amounts of time learning how to use them before the art can be practiced with children.

As I have indicated, the principles of ABA are emphasized throughout this chapter; indeed, throughout the entire book. Those principles, as I mentioned, were used for the research which supports most of the recommendations for teachers in this chapter. Basically, they are as follows: to pinpoint, to chart, to evaluate, and to decide.

Although these notions have been presented and explained in other parts of this book, I will, in the context of this chapter, offer a brief review. To pinpoint means that the behavior should be defined to the extent it can be accurately counted. In arithmetic a class of problems could be defined by specifying all the numbers and processes involved. If $13 + 6 = \underline{\quad}$ was representative of the class, the top and bottom numbers and sum could be delineated. For example, the top numbers could be from 10 to 18, the bottom numbers from 1 to 9, and the sums from 11 to 19. It could also be mentioned in the definition that the problems would not involve carrying. To chart means that those defined behaviors will be graphed; ordinarily, they should be graphed each day. Depending on the nature of the project the responses will be charted as either rate (correct and incorrect) or correct percentage.

To evaluate implies that the teacher will, following each session, study the graphed data and other performance information. On the basis of these data, she will decide what should be done, the next feature of the ABA approach. The teacher will decide whether to alter the type of problem the child is being asked to perform, or will decide whether a different approach to teaching should be used. A fifth and extremely important feature of the ABA system must also be mentioned; that is, this approach is synonymous with individualized instruction.

As I mentioned, the primary focus of this chapter is on computation, although some discussion is presented in reference to story problems. The format I have used to present this material is to begin with placement and then progress through the subsequent steps required to instruct arithmetic skills. Following the section on placement is a part devoted to the establishment of behavioral objectives, referred to here as desired rates. After this portion of the chapter is a section devoted to the arrangement of instructional situations. Next is a part devoted to teaching designs. This segment is followed by a discussion of the various change criteria that can be used to shift from one type of material to another or from one instructional technique to another.

The next section is concerned with learning stages: initial acquisition, advanced acquisition, and initial proficiency. The following part deals with several types of generalization: maintenance, retention, response, and stimulus. The next portion pertains to story problems. A final epilogue is devoted to certain limitations of the chapter; some major unknown areas in the teaching of arithmetic are pointed out.

In each of these sections I have, whenever possible, used data and conclusions from research to support the recommendations offered to teachers. Often, in order to illustrate a particular point; e.g., in respect to desired rates or teaching design, only a portion of a research report is described. Therefore, it is perhaps difficult for the reader to comprehend all the details about a given project. For this reason, most of those condensed studies are referenced. If a reader would like to read the entire reports, we will be pleased to send reprints upon request.

Computation

Placement

The first action required of the teacher is to place the student appropriately in order that instruction can commence. The student must be placed at a level where he knows the necessary requisite behavior. He must also be placed at a level where he is "challenged." In other words, this level must neither be too easy nor too difficult.

In order to place children in levels for purposes of instruction in arithmetic, I would recommend a strategy that progresses from general to specific. For example, if the teacher wants to find out where to begin instruction in arithmetic with a third grade youngster and knows little about his arithmetic career, the teacher should give the child a sheet or two of widely diverse problems. These sheets should contain problems from each of the four processes. Problems of many types from all processes should be included. In subtraction, for example, the following problems could be included: $4 - 3 = \underline{\quad}$, $10 - 7 = \underline{\quad}$, $36 - 7 = \underline{\quad}$, $302 - 103 = \underline{\quad}$, $324 - 136 = \underline{\quad}$. Other types of problems could, of course, be represented.

The child should be encouraged to try to compute each problem, because the teacher needs to know what he can and cannot do so she can appropriately place him. He should be told that he will not be punished or given bad grades if he commits errors during this assessment period, for this is simply a getting-to-know-you phase.

When the child has responded to these different problems, the teacher should carefully study his responses. This analysis may reveal, in respect to subtraction, that the student cannot accurately perform problems of the latter three types: $36 - 7 = \underline{\quad}$, $302 - 103 = \underline{\quad}$, and

$324 - 136 = \underline{\quad}$. Therefore, during the next stage of the assessment, the student could be required to compute several problems of those types. There could be four or five problems of each class on the sheets during this stage.

After the responses to the second round of assessment were studied, several performance patterns could be revealed. The teacher might discover, for example, that the pupil apparently did not know a few subtraction facts (e.g., $13 - 8 = \underline{\quad}$ and $14 - 6 = \underline{\quad}$); he consistently erred on those calculations regardless of the complexity of the problem. During this second stage of assessment, it might also be revealed that the pupil could not borrow from the hundred place when a zero was in the tens place. For instance, his answer to the problem $302 - 103 = \underline{\quad}$ would invariably be 109 rather than 199.

Based on these findings, a third assessment stage could begin. During this period, if the teacher is reasonably convinced she knows where the pupil is having difficulties, she could obtain still more information for two or three days to further confirm those beliefs. An equally important reason for acquiring these data is that they enable the teacher to study thoroughly the response style of the pupil.

The data from this third stage should be graphed: this becomes the baseline of the study. Since the pupil is required to respond to only one type of problem throughout this stage, correct and incorrect rate data should be graphed. The pupil should, during the baseline phase, be required to work either the same number of problems each day or for the same amount of time each day.

The instructions throughout the baseline phase should be minimal, because the teacher needs to know how the pupil "normally" responds to a given set of problems. If the teacher detects certain error patterns when the child attempts to solve the problems, this information could be very helpful when she later needs to select a teaching technique. For instance, the teacher could learn during this phase that not only does the pupil consistently miscalculate the two problems $13 - 8 = \underline{\quad}$ and $14 - 6 = \underline{\quad}$, but he invariably responds with a 6 to the first problem and a 7 to the latter. Based on this information, a teaching technique could be designed. That technique could be used during the second phase of the project, the instructional period.

During these assessment stages, a pupil could be placed in only one type of problem, like the youngster in this example. When he obtained proficiency in that type, he could be advanced to another problem type. This second type could be one which was discovered during the initial assessment stage, or one revealed in subsequent probes which followed the instruction of the first skill.

Alternately, as a result of the assessment stages, children could be placed in several types of problems at the same time. The boy in this example could also have been placed in subtraction problems where 0's were included in the tens place and others where borrowing was required. Pupils could be placed in one type of problem from each of the four processes.

The type of direct assessment I have described here could require several minutes over a two- or three-day period. It has been our experience that when enough time is taken during this assessment process to discover exactly where to begin instruction, the subsequent instruction of most problem types is relatively simple.

Desired Rates

Once the teacher has placed the child at a certain level in order to begin instruction, she must next establish a performance goal. She must express the extent to which a specific problem type should be developed.

The reason for establishing performance objectives is to inform the teacher when she should stop teaching a certain skill. Unless the extent to which a skill should be developed is stated, it is possible some children will be overtaught and others undertaught. In either case, valuable time would be wasted. In the former instance, time is lost because the pupil was not advanced sooner to more difficult, or at least different, material. In the latter instance, time could be wasted if proficiency is not reached on a particular problem type, because later, if the pupil was required to perform, it could be discovered he had lost what little proficiency he had obtained. Consequently, re-teaching would have to be scheduled.

There are at least two ways to express the extent to which a skill should be developed. One is to declare, as Mager advocated, that a certain correct percentage should be reached. For example, if a pupil has been placed in a problem type like $10 - 3 = \underline{\quad}$, a performance objective of 85% correct for three consecutive days could be expressed. The use of correct percentage as a means to specify performance objectives is a satisfactory technique when the pupil is in the initial acquisition stage; that is, when the pupil is initially attempting to learn a particular skill. During this stage, accuracy, rather than speed, is the primary aim. More will be said later about various learning stages such as the acquisition period.

Another way to indicate performance objectives is to use frequency. Teachers can use correct and incorrect response rate calculations to specify these aims. Often these frequencies are referred to as desired rates. This means of expressing objectives is more precise than when percentage is used, because with this approach, the teacher can specify both speed and accuracy. For example, if the pupil has been placed in a class of problems like $33 - 16 = \underline{\quad}$, the desired correct rate could be greater than 20 problems per minute and the desired incorrect rate could be less than 2 problems per minute. With these two specifications, the teacher has simultaneously signified the minimum correct percentage. This latter piece of data is revealed when the desired correct rate is divided by the total of the desired correct and incorrect rate. In this example the correct percentage is 91%.

Whichever approach is used to specify objectives, percentage or frequency, expectations about two other dimensions of performance should

be declared: the number of days the criterion performance should be noted and for how long each day.

As to the former, the teacher could specify whether the performance aim should be reached for two or three consecutive days or whatever. As to the latter, she should indicate whether the daily sessions would last for 20 or 30 minutes or some other length of time.

If frequency was used as the method to signify an objective, the following could be an example: the pupil's correct and incorrect rates while performing problems of the type $6 \times 7 = \underline{\quad}$ should be more and fewer than 20 and 2 problems per minute. He should, before advancing to new material, attain these rates for three consecutive days while working on this problem type for five minutes each day.

Formulating desired rates

There are many ways to arrive at the desired rates or correct percentages that are used for performance objectives. One method for acquiring this information is to obtain data from a peer the same age as the topic student. For example, if the subject was a fourth grader and he was assigned problems of the type $43 - 16 = \underline{\quad}$, data could be obtained for a few days from a superior fourth grader who responded to similar problems. These data could then be used as the performance aims for the topic child.

There are other methods for obtaining these desired figures. The teacher could acquire data from an average peer rather than from a superior youngster. A third method would be to acquire data from an older student. If, for example, the teacher wanted desired rate data for a fourth grader, she could obtain data from average or superior fifth graders. Some teachers have used the data obtained from adults as points of reference. Other teachers have used 50% of the adult rate on certain tasks as the desired rate for children.

Arranging the Situation

Once the pupil has been placed at a certain level for instruction and a desired rate has somehow been determined, an instructional situation must be arranged. The teacher must consider many procedural matters so that a consistent set of circumstances can be arranged.

First of all, she must decide on the general time that the project will take place. It could begin at 10:00 in the morning or at 2:00 in the afternoon; but whenever, the project should be consistently scheduled for those approximate times. As I mentioned previously, the teacher must decide whether to schedule the sessions by time or amount. That is, she must decide whether the pupil should work on the assigned problems for a set length of time each day (e.g., ten minutes), or whether he should respond to an equal number of problems each day (e.g., 25).

Next, the teacher must detail the procedures which will be in effect throughout the sessions. She must decide which instructions will be given to the pupil before he responds to the problems, and what type of feedback will be offered after he has responded to the problems. Although these procedures could vary from one type of problem and from one child to another, the teacher should express these matters for each project and be as consistent as possible in their use.

As a general rule, when the teacher attempts to obtain information about the child's unaffected response patterns throughout a baseline period, the teaching procedures should be simple and natural. The following, for example, are the baseline procedures used by some teachers. First, they hand out the arithmetic sheets and tell the pupil that he should respond to the problems for five minutes. He is also told that he will not be penalized if he makes errors, for it is necessary to learn about his style of responding. While the pupil responds to the problems he is given no assistance. If he says he can not do a certain problem he is encouraged to try the next. After the five-minute period the teacher checks the responses. She marks a "C" by each correctly answered problem and a "I" by each incorrect answer. She also puts the correct answer alongside each incorrect response. No further feedback, reinforcement, or instruction is given.

Worksheets

Another aspect of arranging the instructional situation is to prepare arithmetic sheets. Before these can be constructed, the problem type which has been identified must be carefully described. For example, if the type of problem is $43 - 24 = \underline{\quad}$, the parameters of the top and bottom numbers and the remainder must be identified. An example of this practice was offered earlier. Next, a pool of problems of that type must be formed. The teacher should list each different problem of the identified class she wants to teach. Then she must construct sheets of problems from this pool. If, for example, the teacher wants to use 100 different problems of a type, she could construct different sheets, each with 20 problems. The order in which these sheets are assigned the pupil should vary from day to day. An alternate way to make different sheets, particularly when the pool of problems is small, is to use the same problems on all the sheets but to arrange them differently.

Generally, I would recommend that from 20 to 25 problems be placed on a sheet. This, of course, is dependent on the type of problem. Further, I would recommend that at least five different sheets be developed. Once these sheets have been made, several copies of each could be duplicated. Thus, the teacher will not have to write out arithmetic sheets each day.

At the top of each sheet should be spaces where the following information can be placed: name, date, number correct and incorrect, correct and incorrect rate, and beginning, ending, and total time on the program. I have included a copy of a math sheet to illustrate these features.

Insert Figure 1 about here

The teacher should also design a raw data sheet. On this sheet should be spaces which show the following information: date, day, correct and incorrect rate, and comments about error patterns. Each day the information from a pupil's arithmetic sheet is transferred to this raw data sheet. The data from this sheet are then graphed. Raw data sheets are necessary because they provide a summary of the performance and reveal error patterns over a period of time. An example raw data sheet is included.

Insert Figure 2 about here

Teaching Designs

During the baseline phase, or shortly thereafter, a teaching design must be selected. Although these designs can be changed midway through a project, it is necessary to begin with some design in mind, for they are the blueprints of teaching. It is just as important for a teacher as it is for a researcher to use a design.

The first design I will discuss is the bread and butter pattern of teaching. This design has been used successfully by thousands of teachers. In this design there are four phases (A B A² M). The first phase (A) is the baseline. As I have stated earlier, the purpose of this period is to enable the teacher to identify the child's style of responding. This phase should run for only two or three days. More will be said later about the length of the various phases in the section devoted to change criterion.

The second phase of the project (B) is the instructional phase. This period should last until the desired rates have been achieved. Obviously, if the first intervention is not successful, other instructional phases should be arranged.

During the third phase (A²) the instructional technique is taken away. For example, if the child used cuisinaire rods throughout the instructional phase, he would not be allowed to use them during this third condition. The purpose of this phase is to determine whether the child's performance will maintain immediately after the instructional technique has been removed.

The fourth phase (M) is the maintenance phase. The procedures in effect throughout this phase are exactly as they were during the third phase. The difference now is that sessions should be scheduled intermittently rather than daily. The purpose of this condition is to determine whether the performance of the child will maintain for an extended period after the teaching technique was removed.

A second design that is very useful is one that enables the teacher to test for the generalization effects of teaching (A B A' G M). This design is very similar to the one just discussed. The objective of this pattern is to furnish the teacher with information in regard to the transfer of learning.

This design is generally made up of five phases. The first three phases are identical to those in the preceding design. The baseline phase is scheduled for a few days in order to identify a child's pattern of responding. Throughout the second phase, a teaching technique is scheduled until desired rates are reached. Then, during the third phase, the technique is removed.

The unique phase of this second design is during the fourth, or generalization, phase (G). Throughout this condition, problems are assigned the child that are different from those used in the preceding phases. If, for example, the child was taught problems of the type $33 - 16 = \underline{\quad}$ during the first three phases, he could be given problems of the type $333 - 116 = \underline{\quad}$ during the fourth phase.

To determine the extent to which a child generalized could be an important part of the teaching process. In fact, this type of assessment should, I believe, be routinely scheduled. By so doing, the teacher could learn about another dimension of her pupils. Along with gathering data about their abilities to acquire information (obtained during the second phase of this design) and to retain information (revealed during the fourth condition of the first design), she could learn about their abilities to generalize.

More will be said about this in a section devoted to generalization.

A final, or fifth, phase could, of course, be included in this design. This phase, scheduled for the purpose of learning whether or not the performance(s) maintained over time, would be identical to the final phase of the first design.

A third teaching design is used when the intent is to teach a problem type by parts. This is a shaping design. There could be several variations of this pattern, but generally, five conditions comprise this design ($A^{w1} A^{p1} A^{p2} A^{w2} M$). The first condition (A^{w1} , where w indicates whole) would serve the same purpose as the baseline in the other two designs -- to provide information about the pupil's response characteristics. The pupil's manner of responding during this period may suggest to the teacher that the types of problems should be broken down. For example, during the first phase, the child could be assigned multiplication problems of the type $325 \times 4 = \underline{\quad}$, where carrying was required in both the units and tens columns. It could be that the child, during the baseline, committed at least two types of errors. Sometimes he incorrectly answered problems because he failed to carry from the units to the tens column, and on other occasions he made errors because he failed to carry appropriately between the tens and hundreds column. On the basis of this information, the teacher could decide to use a shaping design.

During the second phase (A^{p1} , where p indicates part), she could use some type of technique to facilitate performance when problems of the type that required carrying in only the tens place were used, like $362 \times 2 = \underline{\hspace{1cm}}$. Then, when criterion was reached with this type, problems could be scheduled in the third phase that required carrying in only the units position (A^{p2}). The instructional technique would continue to be used. Problems like $326 \times 2 = \underline{\hspace{1cm}}$ could be used throughout this period. Once criterion was reached for these problems, the two sub classes could be combined throughout the fourth phase (A^{w2}). This phase would be just like the baseline condition: the instructional technique would not be used. If the pupil could respond accurately to the two types of problems in this phase, the final condition (M) would be arranged. Intermittent checks would be scheduled throughout this phase.

Change Criteria

A very important aspect of teaching is to have some idea about how to make teaching decisions. Generally, teachers, in their efforts to instruct children, need to make two types of decisions. One form of decision is to determine whether to continue using the instructional technique initially selected or to modify this technique in favor of another. The second type of decision is whether or not to continue teaching a particular skill or to begin teaching another. The latter type of decision is dictated by the desired rate that was set. Once this level of performance has been reached, instruction should commence on a new behavior.

In respect to the former type of decision -- whether to continue using an instructional technique or select another -- at least three decision-making strategies have been used.

One type of change criteria is based on the celeration figure of 1.2. (this is explained in some detail in Chapter 6). To use this method, two celeration lines should be drawn after the baseline period: one for correct rate, the other for incorrect rate. The beginning points of the celeration lines should correspond to the median rates throughout the baseline period. If during the first condition, for example, the median correct rate was 10 r/pm and the median incorrect rate was 2 r/pm, the beginning celeration lines in the second phase should begin at those points. An acceleration line of $\times 1.2$ should be drawn from 10, and a deceleration line of $- 1.2$ from 2.

Throughout the instructional phase, the data would be plotted in reference to these lines. If the correct rates were below the $\times 1.2$ line for two of three days, or if the incorrect rates were above the -1.2 line for two of three days, a decision should be made to change the instructional technique.

Another method for making change decisions is based on 30%. When this approach is used, 30% improvement for both rates would be required in order to continue using a technique. In order to use this method, incorrect and correct rate medians should be calculated for each three-day period throughout the instructional phase. If the median for either

rate for a three-day period is not 30% better than the median for the preceding three-day period, a new technique should be selected.

The third method for determining whether to change techniques is based on the date selected for reaching the desired rate. When this approach is used, two points should be plotted at the end of the baseline period: one to indicate the median correct rate and the other the median incorrect rate throughout the baseline phase. Then two more points should be plotted to indicate the date the desired rates should be achieved. If, for example, the teacher wants the child to reach desired rates by three weeks in the future, two points should be drawn at that date, one for correct, the other for incorrect rate. The beginning and ending points which refer to correct and incorrect rates should then be connected. These two lines then serve as acceleration and deceleration lines for the correct and incorrect rates. The decision of whether to continue using one technique or to change to another would then be based on the system used in the first approach. If for two of three days the correct rates were below the line, or for two of three days the incorrect rates were above the line, a new teaching technique should be chosen.

At this point, I would like to comment briefly on the length of the baseline period. There are many factors which influence the number of days a baseline phase should run, e.g., type of behavior, acceleration throughout this period. I believe, however, that in the context of arithmetic, if the accuracy is around 0% for two consecutive days, an instructional change should be scheduled, regardless of the chosen method for determining change.

Although none of the three methods for determining change is perfect, each approach has been used successfully with many children. Data are available which indicate that performances of children have improved in short periods of time when these routines have been used.

It is far better to use some method to change techniques and materials than to be whimsical in these respects. Too often, teachers move from one set of materials to the next when a workbook is finished. This is an inappropriate method for many students: some of them need more practice, others less. When it comes to moving from one technique to another, teachers sometimes shift at inappropriate times. Unless some system is followed, teachers could change later than they should have. They could use the same technique for weeks, even though no progress had been made. Meanwhile, other teachers, unless they use some decision making approach, could give up too soon on certain techniques. There have been instances where techniques which were influencing performance, albeit minimally, were abandoned because the teacher felt that no, or not enough, progress was being made.

Learning Stages

Often, as children learn to compute arithmetic problems, they pass through various learning stages. When they are first being taught some specific problem type, many children are totally unable to answer the

problems. Although they can respond with accuracy to the problems that are requisite to the ones being taught, their correct percentage and correct rate scores on the new type are nearly zero. Meanwhile, their incorrect rates are high. We have referred to this learning stage as initial acquisition.

After the children have been assigned this type of problem for a few days, or after a teaching technique has been scheduled, many children begin to respond at correct percentages between 40 and 60. From one day to the next, their correct and incorrect rates are about equal. Relevant to the preceding stage, their correct rates are higher and their incorrect rates are lower. This stage has been labeled advanced acquisition.

Following this phase, many children began to respond very accurately to the arithmetic problems. Their correct percentage scores sometimes reach 100% and their incorrect rates fall to nearly zero. Meanwhile, however, their correct rates are below the desired rates. We have termed this period as the initial proficiency stage.

Of course, the development from one stage to the next is not always distinct. Often a child's progress across stages, particularly from the advanced acquisition through the initial proficiency stage, is gradual. Other children skip abruptly from one stage to another, whereas some children skip the second stage entirely by jumping from initial acquisition to initial proficiency.

In respect to these learning stages, it must be kept in mind that, although we have identified three stages, from our observations and data, it could be that more refined stages could be discovered later. This notwithstanding, the stages offered here have, to a great extent, been proven functional. Functional in that when performance has been identified as to one of the three stages (initial acquisition, advanced acquisition, or initial proficiency), teachers have been assisted to select appropriate instructional strategies.

To date, it would be presumptuous to list certain instructional techniques that can always be successfully used when arithmetic performance falls within a certain learning stage. However, some modest suggestions in this regard can be made, for we have conducted considerable research in arithmetic in respect to the relationship between specific teaching and learning stages. Although this research is far from complete, our findings have given us the confidence to offer the following suggestions.

Initial Acquisition. As I mentioned earlier, a child is, according to our schema, in the initial acquisition stage when his correct percentage and correct rate scores are nearly zero. Therefore, the child in this stage needs to be shown or told how to do something, e.g., how to compute a certain type of problem.

Modeling has been one technique we have used successfully with children in this stage: we have shown or told them how to solve a

certain type of problem. I will describe briefly an arithmetic project where this technique was used (Smith, D. D., and Lovitt, T. C., 1975).

Prior to the baseline phase of this project, the pupils were required to respond to a variety of arithmetic problems. For a few days, they were assigned many forms of problems from the four processes. The purpose of this survey was to locate a type of problem they could not perform, even though they could perform various types of problems believed to be prerequisite.

Once a problem type was identified, the baseline phase began. This phase generally ran for two or three days. Each day, throughout this period, and the remainder of the study, the pupils were assigned 25 problems. They were told that if they could not correctly answer a problem they should make an effort, and if they had no idea about how to solve it, they should make a mark underneath the problem. Throughout this condition, their correct percentage scores were invariably zero.

During the instructional phase of this project, the teacher solved one problem for the child before he was asked to do the work. While she computed the problem, she verbalized all the steps of the process. After she had solved the problem, she left it on the sheet. Later, when the pupil was asked to respond to the 25 problems, he could refer back to the sample problem. As indicated by Figure 3, which illustrates the performance of one child in the experiment, the technique was effective. It should be pointed out that the technique was just as effective in the 12 other projects.

Insert Figure 3 about here

It should also be mentioned that these effects were immediate. The performance of the example boy, for instance, soared from 0 to 100% following the first day of treatment. In spite of this improvement, however, this boy's correct rate was much lower than the desired rate. This was an instance of skipping from the initial acquisition stage to the initial proficiency stage.

Throughout the third condition of this study, the modeling technique was removed. During a follow-up phase, intermittent measures were obtained in order to determine whether the performance would maintain over an extended period of time. The data during these conditions indicated that the boy's performance continued to be extremely accurate.

A few years ago, we used a verbal mediator as the intervention for a boy whose performance indicated he was in the initial acquisition stage. The following is a short description of that project (Lovitt, T. C., & Curtis, K. A., 1968). During the baseline phase of that experiment, which ran for ten days, he was required to respond to 25 problems of the type $\_\_ - 2 = 6$. Throughout this phase he received no feedback,

instruction, or reinforcement. The boy's accuracy during this time was quite low; often, between 10 and 25%.

During the second phase the boy was asked to verbalize each problem and its answer before he wrote the answer. As indicated by Figure 4, his performance improved markedly; his correct rates increased and his incorrect rates fell to zero. During the third phase the pupil was no longer required to verbalize. The purpose of this phase was, of course, to determine whether the level of performance would continue even though the intervention was dropped. The data indicated his correct rate performance improved markedly during this phase. This improvement was not unexpected because the verbalization requirement throughout the second phase had, along with increasing accuracy, slowed down performance.

Insert Figure 4 about here

This pupil also jumped abruptly from one learning stage to another. When the instructional technique was arranged in the second phase, his incorrect rate immediately fell to zero. Furthermore, when the instructional technique was removed during the third phase, his correct rate immediately rose to what many would consider the desired rate.

There are other techniques that have been successfully used during the acquisition stage. We have conducted several projects where flash cards influenced performance. Another technique which has been effective was to write the answers to the problems on the top of the page. Teaching aids such as cuisinare rods, the number line, and the abacus have been effective techniques during this period.

Advanced Acquisition. Often, when children are learning certain arithmetic skills, they enter a stage where about 50% of their responses are correct. This is the middle learning stage.

A pupil's responses can be 50% correct for at least two reasons. It could be that the reason for 50% accuracy is that the person knows the answers to half the problems of an identified type but does not know the rest. If the class of problems is $54 - 37 = \underline{\quad}$, for example, where there are two digits above and below and where carrying is involved, it could be that the pupil consistently errs if the top numerals in the units column are 4 or 5 and the bottom numerals are 8 or 9. Perhaps all his other responses are correct.

The performer could respond at about 50% accuracy for another reason. It could be that his performance is inconsistent; on some days he answers a problem correctly, whereas on other days he answers it incorrectly. Perhaps one day the answer to the problem $54 - 37$ is 16 and the next day it is 17. Following are examples of both types of performance during the advanced acquisition phase.

A few years ago we arranged a study to evaluate the effects of feedback on performance during the advanced acquisition stage (Blankenship, C. S., & Lovitt, T. C., 1974a). I should mention we studied these effects on three types of performance: initial acquisition, advanced acquisition, and initial proficiency. The pupils in this study attained 50% performance scores because of the first reason.

Prior to our study, we assigned problems of many types to the students until we found a class where their accuracies were between 40 and 60% correct. The response patterns of these pupils were characteristic of the advanced acquisition stage because they consistently responded correctly to about half of the problems and inappropriately answered the other half.

Throughout this study, the pupils were assigned 25 problems each day. From one day to the next the problems were the same, but five different arrangements of the problems were scheduled, so the arrangement of problems varied from day to day.

During the baseline phase of this project the pupils received no reinforcement, instruction, or feedback. Following this phase a feedback condition was arranged. During this condition the teacher corrected each page and returned it immediately to the pupil after he had responded to the items. She placed a check (✓) by each incorrectly answered problem and a "C" by each correct answer. After the paper was returned the student was asked to look at the marks.

This type of feedback was not at all helpful for six students. However, when this procedure was used for one student, his performance improved markedly. On the second day after the feedback was given, his performance improved from 50 to 70%. Furthermore, his performance continued to improve until his scores reached 90% correct.

Since feedback of this type was so ineffective with students who responded consistently to the same 50% of the problems, our recommendation was to use another instructional approach. In instances where the pupil incorrectly answers the same problems day after day, we believe it more appropriate to use a modeling technique. It would be better to show or tell the pupil how to perform the specific set of problems than to tell him day after day his answer was incorrect.

Another recommendation for children performing at this stage would be to use a certain type of feedback along with a modeling or reinforcement procedure. For example, it could be that if a type of feedback whereby the pupil was told the correct answer, and given some type of reinforcement for correct answers would be an effective program.

As I mentioned, another way in which a pupil could respond with 50% accuracy would be if he responded inconsistently, if his answer to a problem was correct one day and incorrect the next. The project that follows was conducted with a girl who displayed behavior of this type.

The subject of this project was a seven-year-old girl. One day at a meeting with the girl's teacher, the mother was informed that her daughter could not subtract. Therefore, the mother, who was a graduate student in special education, decided to teach the girl. Initially she assessed the girl's abilities in arithmetic and confirmed the fact that her daughter could not subtract. More specifically, she learned that her daughter could not perform problems of the type $3 - 2 = \underline{\quad}$ and $4 - 3 = \underline{\quad}$.

After the mother discovered where to place her daughter, she designed several sheets which contained problems of the type just mentioned. Each sheet contained 25 problems. The mother then required her daughter to work on those problems for one minute each day.

Every evening for a one-week period the mother gave no instruction, feedback, or reinforcement to the girl. After the girl had worked for one minute, the mother thanked her and told her she could do something else. Throughout this period her accuracy was between 40 and 60%. The reason for her low scores was that apparently she was careless. One day she answered a certain problem correctly, the next she answered it incorrectly. The mother also observed during this condition that her daughter's correct rates were very low -- generally around 25 problems per minute.

Throughout the next phase of the project, the mother arranged a contingency. She specified that if, on a given day, her daughter's correct rate exceeded 50 problems per minute, she could select the menu for the evening meal. The data from this phase indicated that meal planning was indeed reinforcing, for her correct rates soared. On the average, her correct rates during this phase were 45 problems per minute. Although her accuracy improved throughout this phase to about 90%, her incorrect rates averaged four problems per minute.

In an effort to eliminate errors, the meal-planning contingency was extended throughout the third phase. During this period she could plan a meal if her correct rate exceeded 50 per minute and her incorrect rate was less than 3 per minute. During this period all aspects of her performance improved: correct rate increased, incorrect rate decreased and the accuracy level increased.

A final phase was then scheduled, during which time the meal-planning contingency was no longer offered. Although her correct rate declined slightly and her incorrect rates rose during this period, accuracy continued to be high.

Insert Figure 5 about here

Initial Proficiency. In this learning stage the percentage of correct responding is nearly 100%, but the correct rate is below that

which is desired. Several techniques have been effectively used with children whose development was in the initial proficiency stage. Following are the brief explanations of four of these techniques.

In one initial proficiency project, the intervention was to inform the pupils that they should work faster (Smith, D. D., & Lovitt, T. C., 1974). The pupils in this project were seven boys who ranged in age from eight to eleven. They were initially assigned a problem type where their incorrect rates were nearly zero, and their correct rates were half of the desired rate. Although the pupils in this project were referred to as learning disabled, we used desired rates which were obtained from fourth and fifth grade pupils in regular classes.

Once a problem type was identified for each pupil, five different sheets of problems were developed. Each day throughout the study, the boys responded to these problems for one minute.

During the baseline phase no instructions, feedback, or reinforcement were given. The boys were told when to start and stop working on their problems. Throughout the next phase, the following instruction was written on the top of each page: "Please do this page faster." The teacher made no other comment.

The data from this project indicated that the correct rates of all children improved. The average percent of change from the baseline to the instructional phase was 24%.

A third condition was then scheduled. The written instructions were no longer in effect during this time. When the data from this phase were compared to those of the preceding condition, we discovered that the correct rate performance of four boys had decreased.

A second technique that has been used to accelerate correct rates was to inform pupils about their performance. In one project where this technique was used, the pupils were eight fourth graders. They were pupils in a private school in Mexico City.

Prior to the study, the teacher assigned the pupils several types of problems. She wanted to find a problem type for each pupil which indicated an initial proficiency situation (100% correct, but with a correct rate about half that desired). When appropriate problems were found for each pupil and arithmetic sheets were constructed, the project began.

The pupils responded to the problems for five minutes each day. During the baseline phase, the pupils were given feedback to the extent that they were told the correct answer if they answered a problem incorrectly. The pupils rarely responded incorrectly, however. Although the rates of some children accelerated during this phase, they were still far below the desired rates.

Throughout the next phase, the pupils were informed about their performance. Following each session, the teacher talked to each child

individually. She told each child his correct rate for that day, how it compared to yesterday's rate, and what his correct rate should be. She also showed the pupil a graph which included his daily correct rate plots and a line which indicated his desired rate. When the data from this second condition were compared to those of the previous phase, she noted that the correct rates for all the boys had improved. Furthermore, the correct rates for two boys had reached the desired level.

A third technique which has been used in initial proficiency situations has been to grant children something contingent on their correct rate performance: positive reinforcement. The following is a description of a study where the effects of two types of reinforcers -- free time and toys -- were evaluated. This study was a continuation of the first project where the intervention was a written instruction to work faster.

In this research, seven children were assigned addition problems which required carrying. In every situation, the response patterns of the boys indicated they were in the initial proficiency stage; their incorrect rates were nearly zero, and their correct rates were below the desired rates. Throughout the project, the boys worked on the problems for one minute each day.

During the baseline phase no instruction, feedback, or reinforcement was offered. Throughout the next phase the children could earn free time. In this period, each child's ratio was written on his paper. Before he began to work, the teacher came to his desk and explained the ratio. If 5:1 was written on his page, the teacher explained that for every five correctly answered problems, he would receive one minute of free time. After the child worked on the problems for one minute, the teacher checked the answers and determined the amount of time that had been earned. She then told the child how many minutes he had accrued and he went to a free-time area. There were many games, toys, and puzzles available in the free-time room.

During the third condition of the study, the boys earned points which were redeemable for toy models. The ratios in effect throughout this period were the same as those used in the preceding condition. Before this phase began, each boy selected the model he would work for. Various models were available; the average cost was one dollar. After a boy selected the model he would work for, the teacher wrote the amount of points required to earn it on an index card, attached the card to the model, and put the model on a shelf.

Each day, after the child worked on the problems, the teacher scored his work and determined how many points were earned. She then subtracted that number from the total price of the model. When a model was earned, another one was selected and the procedure continued. During the final phase of this project, no reinforcement contingencies were in effect. The conditions were like those of the baseline.

The results of this project indicated that generally when the children could earn free time, their correct rates improved. The correct rates for six of seven children were greater during the free-time condition than in the baseline phase.

In the third phase, when the boys could earn models, their correct rates increased once again. The correct rates for six of seven boys improved from second to third phase. In the last phase, when baseline conditions were re-established, the correct rates of all the children decreased.

When the data from this project were further analyzed, we learned there was more improvement when free time was contingent on performance than when toy models were arranged. This, however, could have occurred because free time was scheduled first.

A fourth technique which has been used in initial proficiency situations has been to take away points contingent on incorrect responses: response cost. The following project is an example of that technique (Lovitt, T. C., & Smith, D. D., 1974).

The pupil in this project was an 11-year-old girl. Although her performance indicated she was in the initial proficiency stage, her style of responding was different from the pupils in the three projects just outlined. In the former instances, the pupils' response styles indicated they were in the initial proficiency stage, because their correct rates were below those desired, and their incorrect rates were about zero. Although the girl's correct rates were sometimes below the desired rate, the major concern was in regard to her erratic performance. One day her answers to simple subtraction problems would be perfect and her correct rates adequate, while on other days many of her answers would be incorrect and her correct rates below the desired level. When the teacher attempted to discern a pattern to her incorrect answers, there appeared to be none. On some days the girl simply wrote a sequence of numbers for the answers to a series of problems; e.g., 24, 25, 26.

On the basis of her style of responding (correct rates slightly lower than desired and erratic performance), the teacher scheduled a response-cost contingency. In order to best evaluate the effects of such an arrangement, she further decided to arrange a multiple-baseline design.

Throughout this project, the girl was assigned three types of problems each day. These problems were referred to as Class 1 (18-9), Class 2 (24-6), and Class 3 (34-16). She was assigned three sheets, one for each class. Each sheet contained 25 problems.

During the baseline period the girl received no feedback, instruction, or reinforcement for any of the problems. During this period her correct percentage scores were very low on all three classes of problems. Throughout the second condition the response-cost contingency was arranged for the Class 1 problems. In this phase, if the girl responded incorrectly to one of the Class 1 problems, one minute was taken from her recess time. (It should be mentioned that she was given only a 10-minute recess.) The data from this phase indicated that her performance on the Class 1 problems improved immediately. Throughout this condition, her scores on these problems were generally 100%. Meanwhile, her scores on the other two classes were very poor, often zero percent.

During the third condition this same contingency was arranged for the Class 2 problems. At that time the contingency was in effect for the Class 1 and Class 2 problems. The data from this phase revealed once again that performance was immediately influenced. Throughout this period her scores on the Class 1 and Class 2 problems were nearly perfect. Her correct percentage scores for the Class 3 problems continued to be zero.

Throughout the fourth condition of this project the response-cost technique was arranged for all three classes. These data indicated once again the effectiveness of the procedure, for her accuracy in responding to the Class 3 problems was generally perfect.

Several other techniques have been scheduled to influence arithmetic performance in the initial proficiency stage. Pocket computers, for example, have been used. They have, in fact, been arranged in two different ways: contingently and non-contingently. In the former circumstance, situations were arranged whereby the pupils were allowed to use the computer if their correct rates surpassed a specified level. In the latter circumstance, the students were required to practice certain problems a few minutes before they responded to their assignments.

Modeling techniques have also been used with students in this stage. On occasion, teachers have computed arithmetic problems very rapidly while the pupils watched. Other techniques used during this stage have been to post the pupils' rates on a display board, send notes home in respect to daily rates or rate improvement, and schedule flash-card drill prior to the daily assignment.

Generalization

So far, I have written about the acquisition of responses; the development of a group of responses that were directly taught. This is a very important aspect of learning. Indeed, some would argue that the development of specific responses -- beginning with the feeble attempts during the initial acquisition stage then clumsily progressing through the advanced acquisition and initial proficiency stages until the behavior is at full strength and the desired rate is reached -- is the most important aspect of the learning process. I would not contest such a position.

However, I believe the ability to generalize is equally important. It is one thing to acquire a skill under certain conditions, but quite another to be able to demonstrate a slightly different skill in the same situation or the same skill in different situations.

Schools are based on the premise that generalization will occur. Educators have long believed that when pupils were taught certain behaviors in school, they could emit those behaviors in other situations. Teachers have also believed that when students developed certain behaviors in schools, they would be able to perform other, related skills,

even though no direct teaching was focused on the latter events. Some children are able to generalize, others are not.

In this portion of the chapter, I have elected to write about generalization in a rather broad sense. I believe it particularly appropriate, within the context of arithmetic, to approach the topic in this manner. I have chosen to describe and present data relevant to four types of generalization: maintenance, retention, response, and stimulus.

Maintenance. Since I referred to this type of generalization in the section on teaching designs, I will make only a few comments here and present a brief example. Maintenance is most easily demonstrated in an A BA² teaching design. During the first phase the performance of the pupil on an arithmetic problem could be very poor. Throughout the second phase an intervention of some sort could be arranged: either a type of modeling, feedback, instruction, or reinforcement contingency. During this phase the pupil's performance could reach the desired goal. During the third phase the intervention is withdrawn. The purpose of that phase is to determine whether the performance would maintain; in other words, will it generalize. The teacher wants to know if the pupil can perform the desired response under two conditions, one with and the other without an instructional technique.

In a project I described earlier (Lovitt, T. C., & Curtiss, K. A., 1968), where the pupil verbalized the problems and answers prior to writing his responses, the maintenance type of generalization was illustrated. To review, this project was composed of three conditions. During the first phase the pupil was assigned 25 subtraction problems; no intervention was in effect at that time. Throughout the second condition the verbalization intervention was scheduled. After performance was satisfactory for a few days, a third condition was arranged. During that period the intervention was not in effect. This latter phase was scheduled, of course, to determine whether the boy could generalize from one instructional setting to another. In that instance, his behavior maintained or generalized.

Retention. The second type of generalization has to do with retention. Generalization of this type is noted when the pupil's performance level continues over an extended period of time. Retention differs from maintenance in that the latter generalization is indicated immediately after the behavior is acquired.

In order to obtain data in respect to a pupil's ability to perform a specific arithmetic task over a period of time, the first teaching design would be used. During the first phase no intervention is scheduled; the intervention is arranged throughout the second phase. During the third phase daily measures would continue to be obtained, but the teaching intervention would not be arranged. The pupil's ability to remember the skill over a long period of time would be assessed during the fourth phase, during which time intermittent measures would be scheduled. These measures could be obtained every other day for two weeks, then once a week for six months. Many other intermittent arrangements could be scheduled, of course.

It is particularly important to obtain retention measures in situations where proficiency in respect to a particular problem type has just been reached and where a different, possibly competing, problem type is being taught. Following is a description of a project where this was the case: where the ability to remember a problem type was monitored while a new problem type was being presented (Lovitt, T., Smith, D., Kidder, J., & Evlson, R., 1974).

In this project a boy was assigned six sheets of problems daily. There were from 20 to 25 problems on each sheet. The problems on two of the sheets ($S1^a$ and $S1^b$), were of the type 18-9, whereas the problems on two other sheets ($S2^a$ and $S2^b$) were like 24-6. The problems on two other sheets ($S3^a$ and $S3^b$), were like 34-16. Although the problems on the $S1$ sheets were from the same class, they were different problems. The same was true of the problems on the $S2$ and $S3$ sheets.

There were eleven conditions in this study (see Figure 6). The first condition was the baseline; no intervention was in effect throughout this period. The percentage correct scores in this period were all zero. During Phase 2, the pupil was given paper clips as he worked on the $S1^a$ problems. His performance on the $S1^a$ and $S1^b$ problems was good during this period. His accuracy was very low on the other sheets, however. During the next phase the clips were removed; performance continued to be satisfactory on the $S1^a$ and $S2^b$ sheets.

Insert Figure 6 about here

Throughout the fourth phase the boy was allowed to use an abacus as he worked the $S2^a$ problems. His correct percentage scores were generally 100% on the $S2^a$ and $S2^b$ problems. Meanwhile, his accuracy continued to be satisfactory on the $S1^a$ and $S1^b$ problems. Within the context of this discussion, it is important to note that his performance on a previously taught set of problems ($S1^a$) maintained. The generalization first noted in Condition 3 for those problems had retained.

During Condition 5 the abacus was removed; he could not use it as he worked the $S2^a$ problems. Nevertheless, his performance on the $S2^a$ and $S2^b$ problems continued to be satisfactory. Meanwhile, however, the boy's accuracy on the $S1^a$ and $S1^b$ problems deteriorated. The generalization previously noted had collapsed. Consequently, an intervention had to be rescheduled for the $S1^a$ problems. During this next phase (Phase 6) accuracy was quickly re-established on the $S1$ problems. Throughout Phase 7 the intervention on the $S1^a$ problems was removed. Throughout Conditions 6 and 7, when attention was refocused on $S1^a$, his performance on the $S2^a$ and $S2^b$ sheets continued to be satisfactory.

Throughout these seven conditions, when the focus was on either $S1^a$ or $S2^a$, the boy's performance on the $S3$ sheets was very poor; in fact, his percentage scores on these problems were zero each day. During the eighth phase an intervention was scheduled for the $S3^a$ sheet. Daily,

the boy could use cuisinaire rods as he worked those problems. Consequently, his performance greatly improved.

Meanwhile, however, his scores seriously deteriorated on the $S2^a$ and $S2^b$ problems. Thus, the generalization that had been established during Condition 5 and had continued throughout Condition 7 collapsed. Therefore, during the tenth phase, a second intervention had to be associated with the $S2^a$ problems. The data from this period indicated that his accuracy on the $S2$ sheets was quickly re-established.

As accurate performance on the S^2 problems reoccurred, however, his performance on the S^3 problems deteriorated. Had the experiment continued, an intervention would have been reprogrammed for those problems.

This project demonstrates that some generalizations are transitory: they can be weakened when other, closely related responses are taught. This weakening of a generalization occurred three times in this project, once with each class of problems.

Response. This type of generalization is indicated when a pupil learns a certain skill, even though no teaching had been directed toward that skill. For example, if a child is taught to regroup when the problem type is $46 + 14 = \underline{\quad}$, he might also learn to compute closely-related problems like $44 + 16 = \underline{\quad}$ or $47 + 14 = \underline{\quad}$, or more distantly related problems like $98 + 17 = \underline{\quad}$ or $466 + 144 = \underline{\quad}$. This is an extremely important dimension of learning, as are the other types of generalization and distinct from the acquisition of a skill which was directly taught.

Earlier, I described a teaching design that could be used to obtain information in regard to response generalization; five phases comprised this design. The first phase was the baseline. During the second condition an intervention was scheduled. During Phase 3, if desired rate had been achieved, the intervention was removed. Phase 4 was the generalization phase. At this time the pupil was assigned a problem type different from that scheduled in the first three phases. The fifth phase of this design was conducted for the purpose of determining whether performance in respect to either problem type had maintained.

There is another method for obtaining information in reference to response generalization. When this alternate method is used, measurements are simultaneously obtained in regard to two or more behaviors, but teaching is focused on only one. The following is a brief discussion of a study where this design was used to monitor two types of generalization.

This project was conducted with seven learning-disabled boys, ages eight to eleven (Smith, D. D., & Lovitt, T. C., 1975). The project began after their performances had been carefully assessed and they were placed in initial acquisition situations. This study was partially explained earlier to illustrate the use of a particular teaching technique during the initial acquisition stage.

During this study we were interested in two types of response generalization: within and across. Within-class generalization was indicated if a person learned to respond to some one of problems that was not taught when teaching was focused on another set, and when both sets shared the same numerical and process characteristics. Across-class generalization was indicated if a person learned to respond to a set of non-taught problems whose characteristics differed in some respect from a set of problems that was taught.

In order to determine whether these generalizations would occur, the pupils were assigned three sets of arithmetic problems each day. The first two sets (Sets 1^a and 1^b) were drawn from the same pool of arithmetic problems. That pool could be three-digit by three-digit subtraction problems which required borrowing in the units column, e.g., $280 - 128 = \underline{\quad}$. The problems in both sets shared these characteristics, but were different problems. The problems in the third set (Set 2) were of a different class. For example, if the example type of problem was representative of the Set 1^a and 1^b problems, a problem like $700 - 468 = \underline{\quad}$ could represent the Set 2 items. All of these latter problems would be three-digit by three-digit subtraction problems, but borrowing would be required in the units and tens columns.

During the first phase of the study no intervention was arranged. Throughout the second phase a modeling procedure was used. This technique was described in some detail earlier. Modeling was scheduled for only the first set of problems, not for Sets 1^b or 2. Figure 7 shows the performance of a boy where within-class generalization had occurred. When the technique was associated with the Set 1^a problems, his accuracy increased. Meanwhile, his performance improved just as much on the Set 1^b problems, even though no teaching was directed toward those items.

Insert Figures 7 & 8 about here

Figure 8 illustrates the across-class generalization of a boy. In the third phase of this project, when the modeling procedure was scheduled for the Set 1^a problems, his performance improved on those items. Furthermore, his performance improved on the Set 2 problems, even though no teaching was arranged for that class of problems.

Stimulus. This type of generalization would be indicated if a pupil was taught to compute problems where a certain presentation mode was used, and could later continue to perform those problems when the presentation mode differed. An example of this would be if a pupil initially learned to compute basic add facts when they were presented orally and later was able to compute those same problems when they were presented visually.

A pupil's ability to generalize from one stimulus situation to another could be determined in the same way that response generalization

is assessed. Either the generalization design discussed in the section on teaching designs or the one just described could be used.

The following project is a case where stimulus generalization did not occur (Smith, J. O., & Lovitt, T. C., 1973). In this project, two sets of problems were assigned to a young man each day. One set of problems was written in a standard vertical form (34 $\begin{smallmatrix} +2 \\ \hline \end{smallmatrix}$). The other set of problems was identical, except they were horizontally written (34 + 2 =).

Throughout a baseline phase the pupil's responses to the vertically-written problems were 100% correct. His responses to the horizontally-written problems were 100% incorrect. Although his answer to the problem 34 was 36, his answer to the problem 34 + 2 = was 72.

Invariably, $\begin{smallmatrix} +2 \\ \hline \end{smallmatrix}$ his method for answering the horizontal problems was to add the two numbers on the left (the sum of which would be 7 in the example above), use that as the tens-place answer, then transfer the number on the right to the units place of the answer.

During a second phase of this project an intervention was associated with the horizontal set of problems. First he was presented the problem in its vertical form (34 $\begin{smallmatrix} +2 \\ \hline \end{smallmatrix}$). After he solved the problem, the add

sign and the addend were rotated $\begin{smallmatrix} +2 \\ \hline \end{smallmatrix}$ until 34 became 34 then 34 + 2 = .

Then lines were drawn to connect the $\begin{smallmatrix} +2 \\ \hline \end{smallmatrix}$ units numbers (34 + 2 =). He was then told to add those numbers first and place that amount in the units place of the answer, and then to place the remaining number in the tens place of the answer. Although only one example was provided each day, the boy learned to add horizontally in a few days.

In this section I wrote about four types of generalization: maintenance, retention, response, and stimulus. As I mentioned, I believe it is just as important to deal with these matters as it is to be concerned with the acquisition of skills. For one thing, it is just as important to describe an individual's abilities to generalize as it is his ability to acquire. Quite possibly, there are individuals who acquire information very rapidly, yet do not remember that skill over a period of time and cannot generalize to different situations or to different problems. Alternatively, there are perhaps individuals who ordinarily acquire behaviors at slow rates, yet are quite able to remember and generalize. It would appear that the latter type of individual should receive different educational treatments than the first.

This matter of differential treatments brings up a second reason I believe it important to be concerned about the multi-dimensions of generalization. It is quite possible that different instructional techniques are required to teach certain aspects of generalization than those used to teach the acquisition of a skill. It is possible that new techniques will have to be developed to teach children to remember and to transfer information from one setting or type of response to another.

Story Problems

Story problems have been taught for generations, apparently because teachers believe they require students to use their competencies with basic facts in more relevant situations. Most teachers agree that it is one thing to teach a pupil to add $4 + 4 = \underline{\quad}$, and quite another to teach him to solve the following problem: "If Roy had 4 apples and Sue gave him 3, how many did he have in all?"

Some teachers contend that the reason students have difficulty with story problems is that arithmetic books are difficult for children to read. Some believe arithmetic books are in fact more difficult to read than basal reading texts. In a little descriptive study we conducted a few years ago, we compared the reading rates of several children as they read from basal texts and commercial math books. We found that generally, the children could read the arithmetic texts as well as or better than they could the basal readers.

Other teachers contend that factors other than readability account for the difficulties children have with story problems. Some believe that problems which contain extraneous information are difficult for children. Other teachers advance the notion that matters such as verb tense, the mode of the numerals, and irrelevant cues influence performance.

In one of our initial efforts to determine which factors could influence the performance of children, we attempted to determine the characteristics of story problems in a number of commercially available arithmetic texts. We made two discoveries from this survey. For one, we learned that the scheduling of story problems throughout the texts was quite random. In most books, a page or two of story problems would be included every so many pages. The number of pages between bursts of story problems varied considerably. The number of problems included in a group also varied from one part of a book to another.

Our second discovery from this survey was that the types of story problems included in the books were not grouped together. We found that story problems of several types were included on the same pages. Furthermore, there was slight relationship between the type(s) of story problem(s) being taught and other aspects of the arithmetic programs such as computation problems.

Based on this survey and other preliminary investigations, we decided to conduct a study that would enable us to recommend certain approaches to the instruction of story problems (Blankenship, C. S., & Lovitt T. C., 1974b). Our first task was to identify a number of types of problems. After we analyzed the problem types in several arithmetic texts and read the literature in regard to story problems, we settled on 12 classes of problems. Those classes are explained and a sample problem is provided in Table 1. The classes were developed by modifying several characteristics: number and type of nouns, verb tense, presence of an introductory sentence, presence and placement of extraneous information, verbal cues, form of the question, and mode of the numeral. Using these 12 classes, several sheets of five problems each were formed.

Insert Table 1 about here

Before the study began, we determined whether the students had two requisite behaviors. First, they were required to perform the addition and subtraction facts that were used in the first class of story problems at 100% accuracy for three consecutive days. Next, they were required to say all the words used in the first group of story problems. If they could neither perform the problems nor say the words, they were taught to do so. Prerequisites like these ensured that if pupils later made mistakes on story problems, we could be reasonably certain those errors were made because of the structure of the problem, not because of the simple calculations or words.

Throughout this study, the pupils were assigned three pages of story problems: one addition, one subtraction, and one combination. They began with the Class 1 problems and progressed through Class 12.

When the Class 1 problems were first introduced, a pupil received no instruction. If he attained the criterion of three consecutive 100% scores for all three sheets, he advanced to the Class 2 problems. If criterion was not reached within six days, Technique 1 was scheduled.

When this technique was used, the teacher corrected the pupil's paper by marking each answer as correct or incorrect. She then asked him to read orally each incorrectly answered problem and tell her the correct answer. If criterion was met, the pupil advanced to the next class. If a pupil failed to reach criterion within six days when this technique was used, another teaching technique was scheduled.

When the teacher used Technique 2, she corrected and returned the story problems after the pupil had responded to them. The student was then required to write out each incorrectly answered problem and furnish the correct answer. The teacher checked his paper to be certain these new responses were correct. If not, the process was repeated. If the criterion was met within six days, the pupil was assigned the next class of problems. If not, the third technique was scheduled.

The basis of Technique 3 was to re-examine the solution of the problem. When this technique was used, the teacher checked the responses as either correct or incorrect and returned the paper to the pupil, as she did for the other two techniques. The student was then required to read orally each incorrectly answered problem. He was also asked to explain how he arrived at his solution and to provide an alternate (correct) answer. As was the case when the other techniques were used, the pupil was advanced to another class of problems if criterion was met. If the criterion was not met, Technique 1 was rescheduled. There was only one instance in the entire study when Technique 1 was used a second time.

This arrangement of progressing from one class to another took place over an 80-day period, during which time all the pupils advanced

through the complete program. Throughout this project, several pieces of data were kept which included: (a) number of problems computed correct and incorrect per minute; (b) percentage of correctly computed problems; and (c) number of days required to reach criteria per class. When the pupils' performances during the first baseline phase were compared, in respect to the three types of data, to their performances throughout the study, there were several findings.

First, when the number and type of noun was varied in certain classes, the correct rates of the pupils were lower. Their correct percentage scores, however, remained high. Second, when the tense 'was given' was used, neither the pupils' accuracies nor their correct rates were affected. However, when the verbs "purchased" or "bought" were used, the correct rates and correct percentages were lower, and an increased number of days to reach criterion was required.

Third, when an introductory sentence was used, the correct rates were generally lower. Fourth, when either the verbal cue, question, or mode of the numeral was changed, neither the correct rates nor the correct percentages were adversely influenced. Fifth, when extraneous information was included in the problems, pupils' correct rates and correct percentages were lower.

A graph which depicts the performance of one pupil is included (see Figure 9). The performance of KA was typical of the other students. It is obvious that KA's accuracy was high until the Class 4 problems were introduced. When these problems were scheduled, which included extraneous information, his accuracy decreased. Although Technique 1 was scheduled at this time, it was never used, because from the day it was planned, the pupil's performance improved. It is also apparent in the graph that KA's performance was impaired when the Class 5 problems (which also included extraneous information) were scheduled. His accuracy improved, however, after Technique 1 had been used for one day. Later, his performance deteriorated slightly when the Class 12 problems were presented; but when Technique 1 was scheduled, his performance quickly improved.

Insert Figure 9 about here

When the teaching techniques were scheduled, the students were quickly able to solve the problems of the various classes. Technique 1 was used 30 times. In 63% of those instances this technique assisted them to achieve criterion. Technique 2 was used 11 times and was effective in 73% of the cases. Technique 3 was used only three times and was effective in two of those instances.

After the students had mastered all 12 classes of problems by progressing from one type of problem to another, we were interested to learn how they would perform when required to respond to several different types of problems. We were curious, in other words, to learn

whether they could discriminate between one type of problem and another.

In order to obtain this information, we constructed several sheets of problems which contained problems from all 12 classes. We then required the pupils to respond to these mixed sheets for a few days. Data in respect to those sheets indicated their average correct percentage was 96%. Their overall performance indicated that not only were they able to compute accurately problems of one type at a time, but they retained this accuracy when required to respond to a variety of problem types.

Based on our experience with this project, several recommendations could be offered to teachers in regard to the instruction of story problems. First, teachers should identify the types of story problems they wish to teach. They should decide whether the problems should contain extraneous information, whether a lead sentence should be included, whether the numerals should be written or as numbers, or whether the solutions to the problems should be written in blanks. There are many other dimensions of story problems the teacher should consider. As I mentioned earlier, the story problems in commercially available texts varied widely in respect to these characteristics.

Second, once the types of problems have been identified, several problems of each type should be constructed. As is true of the instruction of any skill (e.g., reading, computation), many items must be available. Ordinarily pupils need to respond to many stimuli, whatever the topic, in order to become proficient in respect to that skill. There are only a few problems of any specific type in any of the arithmetic books on the market today.

Third, a group of instructional techniques should be selected. Although the best instructional techniques are those which are based on the particular response characteristics of the performer, it is a good idea for the teacher to have some general techniques in her repertory. The techniques used here were effective, particularly the first two. Since the third technique was used only three times, a strong case cannot be made for its effectiveness. Not only were the techniques used in this project effective with our population, but other researchers have proclaimed their usefulness.

Once the teacher has defined the classes of problems she wishes to teach, constructed several problems of each type, and decided upon a few potential teaching techniques, she should proceed in much the same way she would to teach computation. She should begin with a baseline period, determine desired rates, select a method for determining change, and chose a teaching design.

Gray Areas

As I mentioned in the beginning of this chapter, the suggestions offered here in regard to the instruction of basic computation and

simple story problems are based on data. We have conducted many research projects over the past several years. These studies have enabled us to speak with some confidence about the aspects of arithmetic program we included in this chapter.

There are, however, at least four major areas where our research and that of others is lacking. Therefore, any statements about those topics would be presumptuous.

One of those areas was mentioned in the beginning of the chapter, where I noted there are many facets of a mathematics program that were not dealt with here. In this chapter, I did not respond to such important matters as sets and unions, time, measurement, and many other concepts. I believe, however, that the Applied Behavior Analysis techniques described here and the general strategies for teaching computation and story problems outlined on pages ___ to ___ could easily be adapted for the instruction of those skills.

The second matter I did not cover in this chapter has to do with sequencing. Although I believe that some arithmetic sequences appear quite obvious, others are not. For instance, I believe it important to teach children the basic add facts like $4 + 3 = \underline{\quad}$ before they are taught problems like $476 + 675 + 732 = \underline{\quad}$. I am not certain, however, about the best sequence of the many problem types between these two classes. For example, should children be taught to calculate three-column addition problems without carrying before or after they are taught to carry?

In order to decide about these arrangements, the teacher must determine whether it is necessary to learn one element before another can be acquired. If problem types of this sort are identified, certainly those sequences should be arranged. Often, however, I don't believe it makes any difference as to which sequence is used. In respect to many problem types, I would hypothesize it would be as easy to learn them if any one of several sequences was followed. I would also posit that certain sequences are individually relevant. That is, one sequence of problem types is best for one pupil, but another arrangement is more appropriate for a different child.

Although no one complete sequence can be recommended in respect to any of the four computation processes or for story problems, the teacher who measures can determine for any child whether or not she has selected an appropriate sequence. Obviously, if a pupil attained proficiency on one problem type and was advanced to another and had great difficulty reaching criterion on the second type, that sequence was, for him, inappropriate.

The third gray area in regard to arithmetic instruction also relates to sequencing, but now to the scheduling of the four computation processes. There are some teachers who recommend that addition should be taught first, then subtraction. Others suggest that the two processes should be taught simultaneously. There are similar arguments when it comes to teaching multiplication and division. Some teachers recommend that addition and multiplication be taught at the same time and that subtraction and division be taught together.

About the only recommendation I could offer in this regard would be to attempt to blend the various processes as much as possible, in order to instill the idea that numbers can be variously grouped and ordered. I would also suggest, as I did earlier in reference to sequencing within the four processes, that it may be of little difference how the processes are taught. It could be that certain children learn all of their facts by progressing through one plan, and other children learn by following a totally different order.

The fourth area where little data are available has to do with generalization and discrimination. If the generalization approach to teaching is followed, the teacher would instruct one class of problems at a time; then perhaps after several classes had been learned, the classes would be combined, and, if necessary, the pupils would be trained

to discriminate among them. The strategy of teaching one class at a time was followed with all the computation research presented here. The idea of teaching one class at a time, then combining the various classes at the end was used in the story problem research described earlier.

It is possible that the contrary approach -- discrimination instruction -- is as good or better than the generalization plan. If the discrimination strategy is used to teach children to compute or solve story problems, two or more types of items would be scheduled at the same time. If the pupil had difficulty discriminating one type from another, discrimination training could be provided. However, if he was initially able to discriminate between a few types of problems, more types would be added.

These gray areas offer many opportunities for mathematics researchers. Several interesting and rewarding studies could be arranged to investigate these matters of sequencing, generalization, and discrimination. Other studies could be designed to investigate the instructional problems associated with teaching mathematic skills other than those dealt with in this chapter.

Table 1

Pupils' Mean Baseline Performance in Each Class of Story Problems

Vocabulary Manipulated	Class Number	Problems per Minute		Percent Correct	Days to Criterion
		Correct	Incorrect		
Number and type of nouns	1	14.4*	.7	96.3	8.6
	2	20.0	.6	98.0	6.7
	7	16.8*	1.0	97.4	6.6
Tense of verb	9	26.1	.2	99.0	4.7
	12	13.0*	1.1	91.7*	10.2*
Introductory sentence	3	17.0*	.6	97.5	7.6
Presence and placement of extraneous information	4	9.9*	2.0*	79.6*	8.4
	5	6.6*	6.2*	66.4*	14.7*
	6	11.9*	.7	94.2	11.6*
Form of verbal cue	8	27.2	.7	97.7	8.3
Form of question	10	27.0	.7	97.7	7.4
Mode of numeral	11	18.9	.7	96.2	8.4
Total Mean		17.4	1.3	92.6	8.6

Note -. * Performance inferior to total mean for all classes

Figure Captions

Figure 1. Sample arithmetic sheet.

Figure 2. Example raw data sheet.

Figure 3. Data which indicate modeling was a successful technique during the initial acquisition stage.

Figure 4. Data which indicate a verbal mediator influenced performance during the initial acquisition stage. These data also indicate the maintenance type of generalization.

Figure 5. Data which show that a meal-planning contingency was effective during the advanced acquisition stage.

Figure 6. Data which demonstrate the retention type of generalization. These data also indicate two types of response generalization: within and across class.

Figure 7. Data which indicate that within-class generalization had occurred.

Figure 8. Data which indicate that across-class generalization had occurred.

Figure 9. Data throughout the several conditions of the story problem study. Correct percentage data in respect to three forms of the story problems are shown: addition only, subtraction only, addition and subtraction. The slashed lines indicate a technique was scheduled, but not used.

Figure 1

Name _____ # correct _____ correct rate _____
 Date _____ # incorrect _____ incorrect rate _____
 Time begun _____ Time ended _____ Total time _____

25 <u>-8</u>	71 <u>-6</u>	51 <u>-8</u>	31 <u>-5</u>	91 <u>-3</u>
54 <u>-9</u>	71 <u>-4</u>	22 <u>-5</u>	31 <u>-5</u>	63 <u>-4</u>
52 <u>-3</u>	41 <u>-8</u>	31 <u>-3</u>	67 <u>-8</u>	23 <u>-4</u>
41 <u>-5</u>	32 <u>-5</u>	52 <u>-8</u>	41 <u>-9</u>	31 <u>-8</u>
81 <u>-5</u>	25 <u>-9</u>	92 <u>-8</u>	81 <u>-6</u>	42 <u>-3</u>
23 <u>-5</u>	62 <u>-5</u>	95 <u>-9</u>	21 <u>-9</u>	54 <u>-9</u>

185

STUDY I

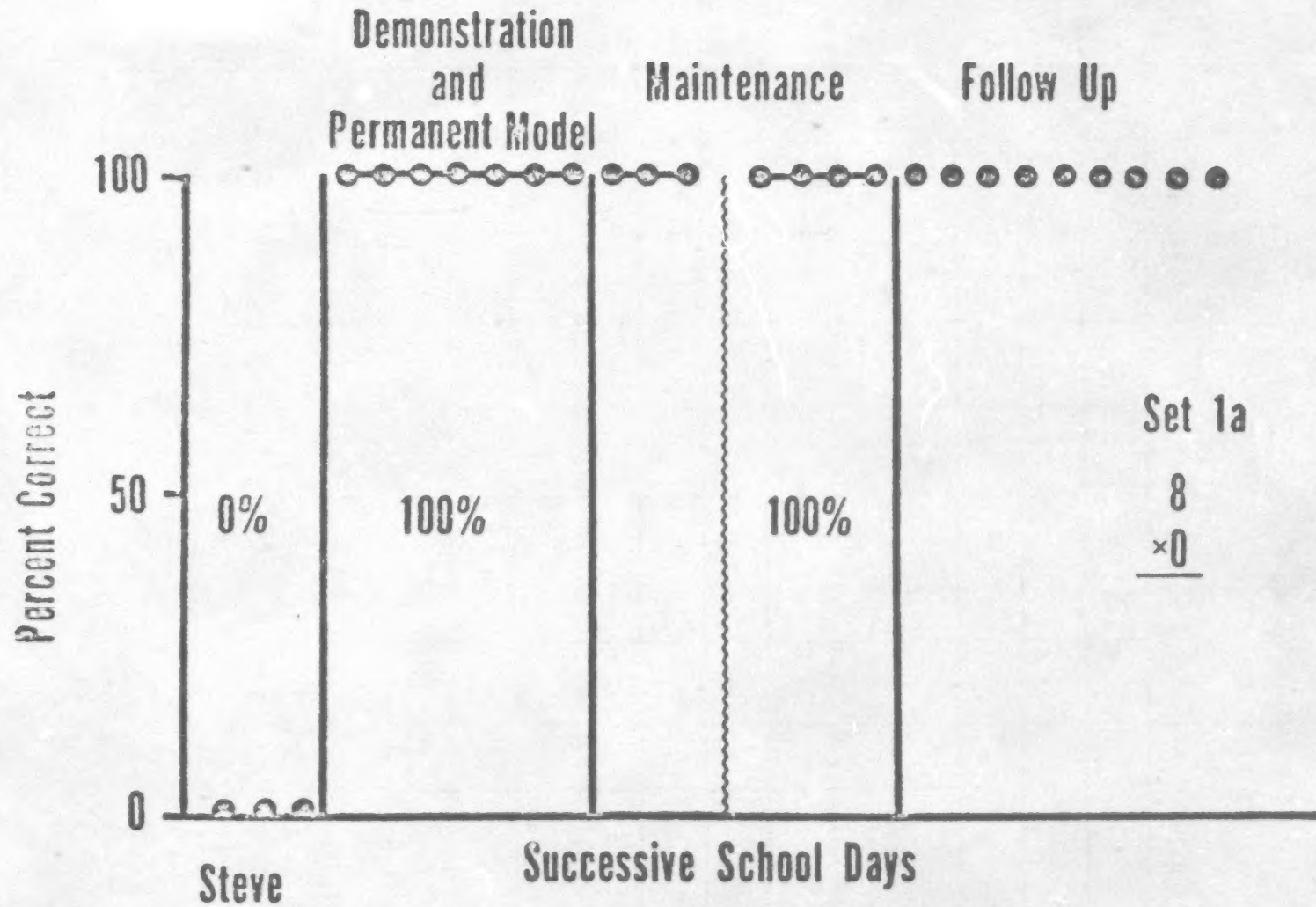


Figure 3
-166-

Figure 4

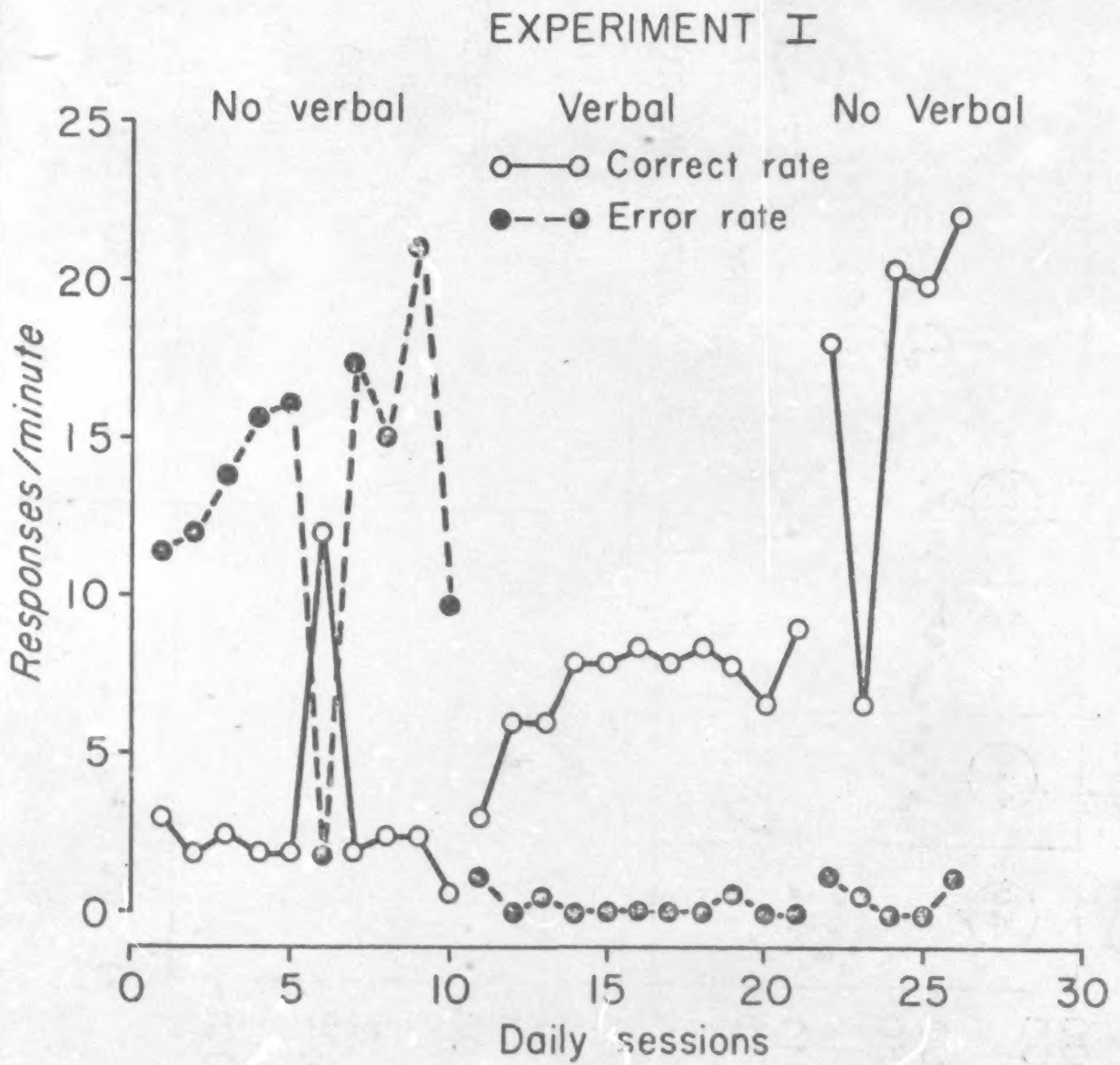
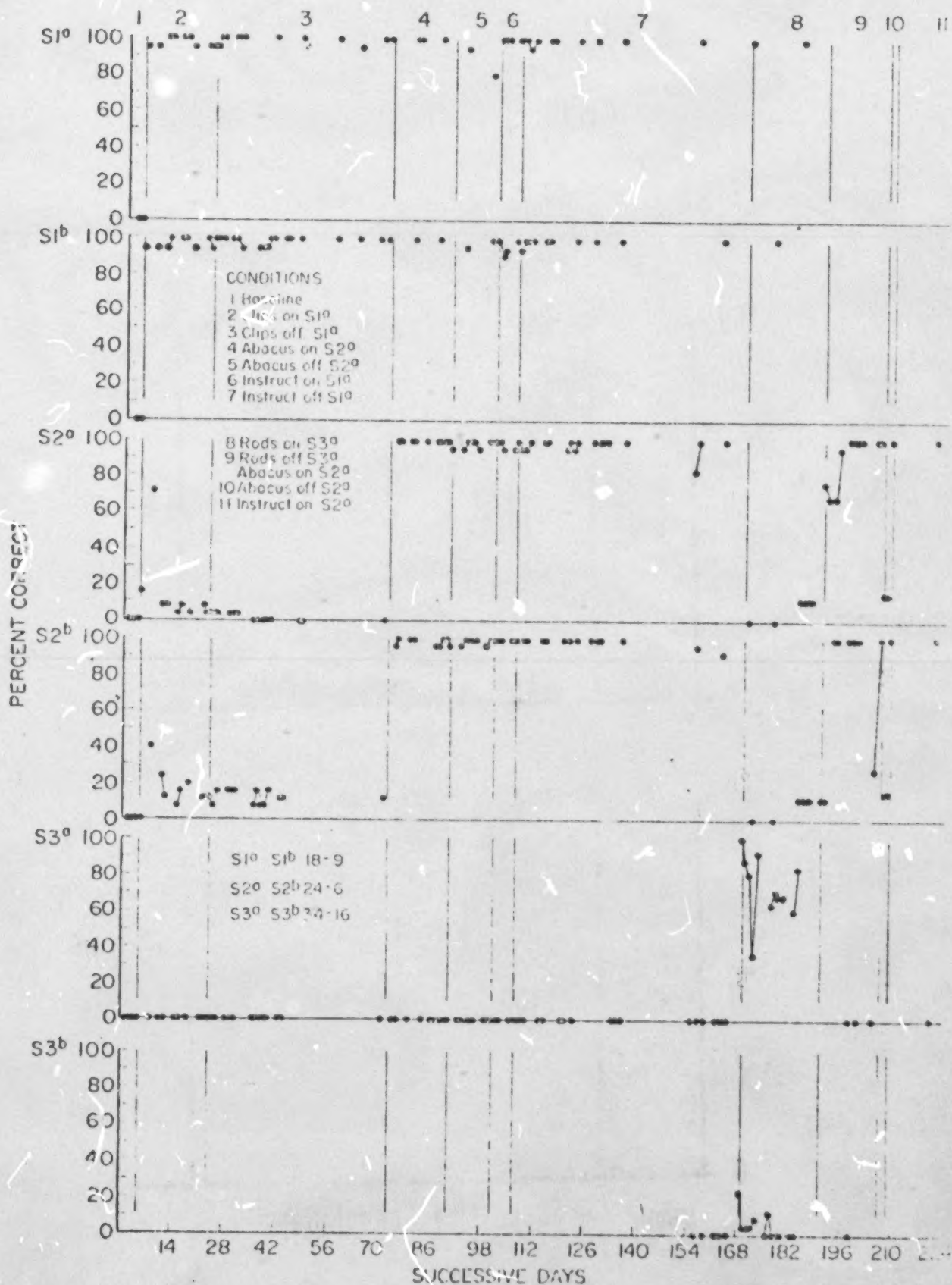


Figure 5



EXPERIMENT II

Figure 6



WITHIN CLASS GENERALIZATION

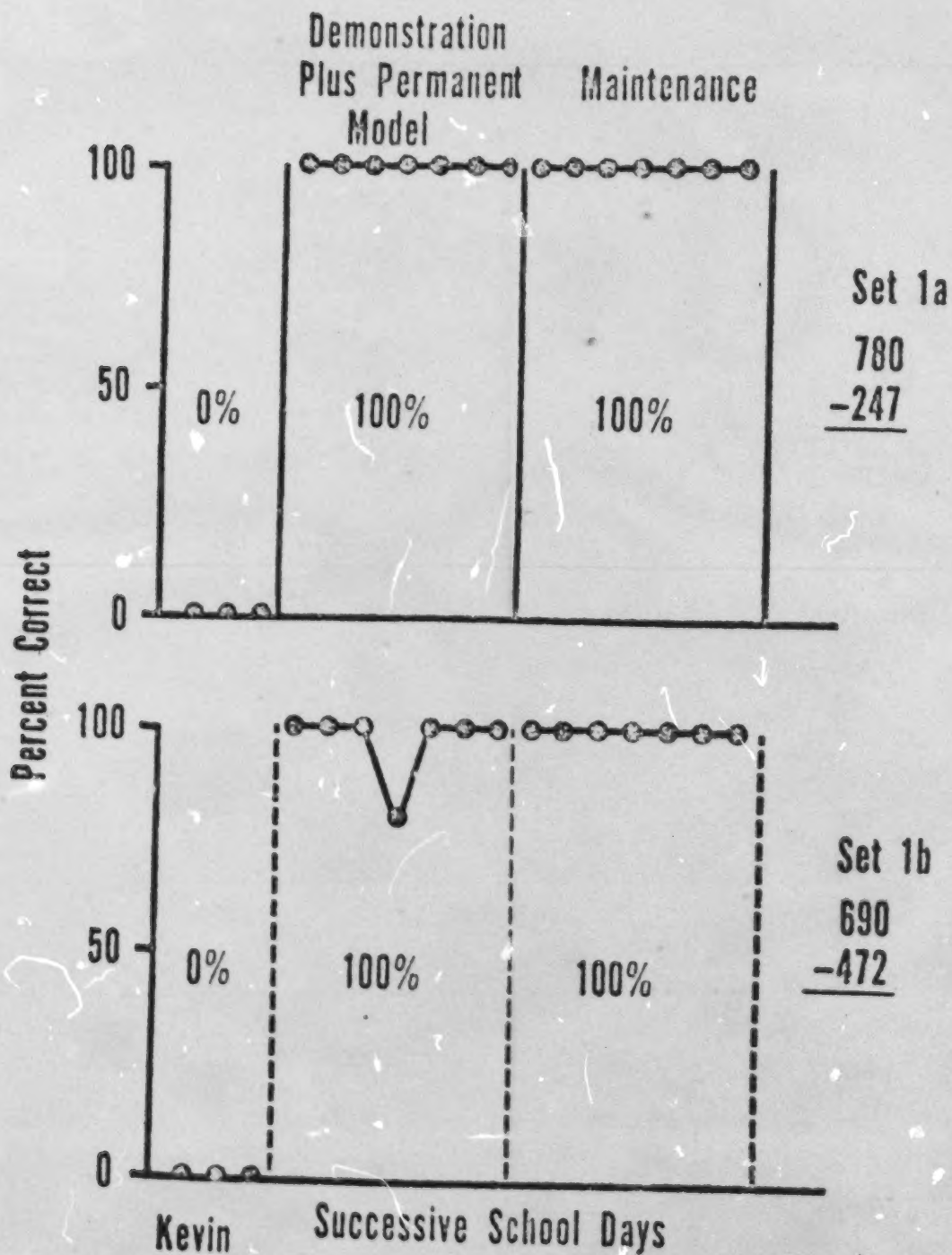
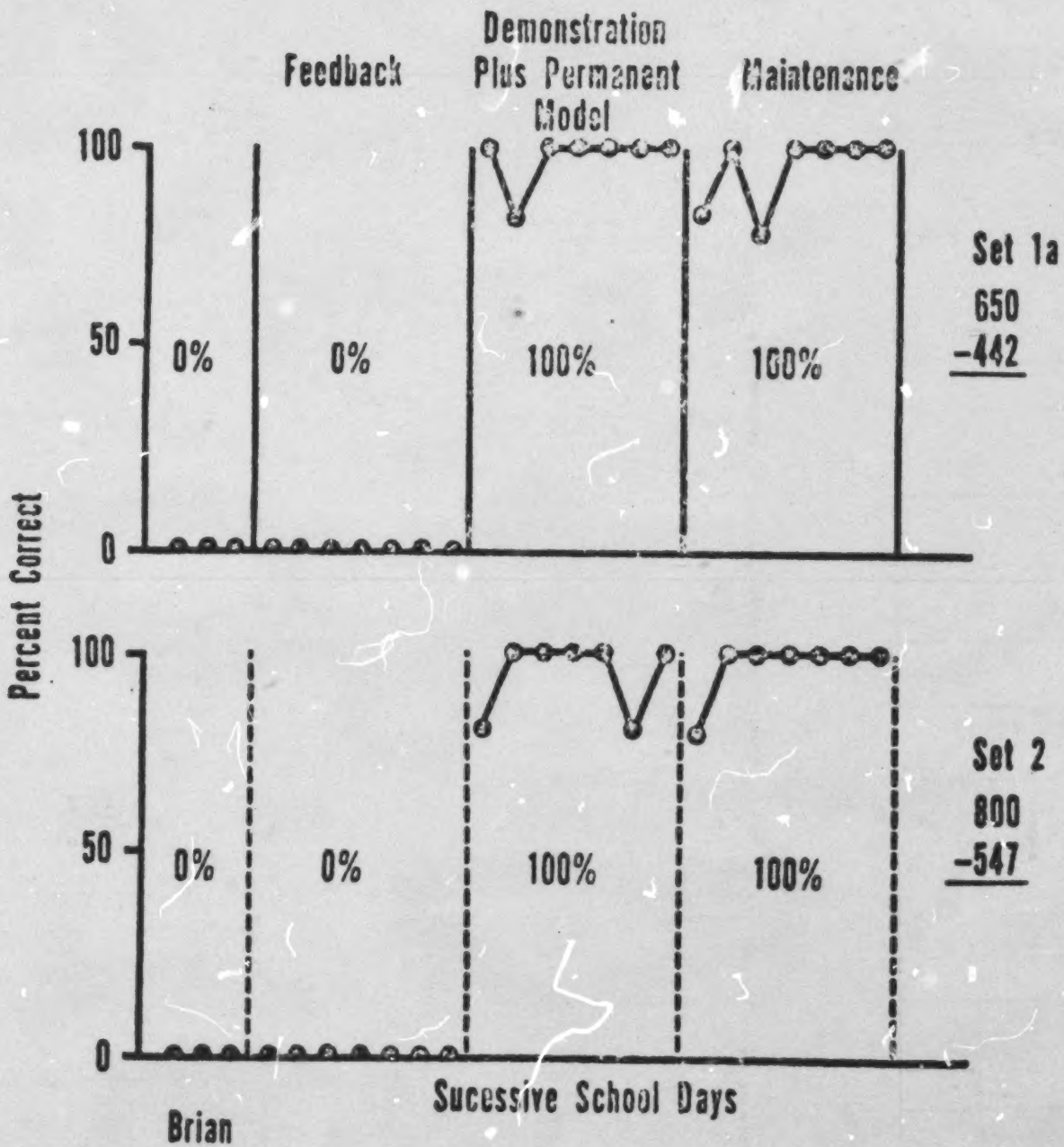


Figure 8

ACROSS CLASS GENERALIZATION



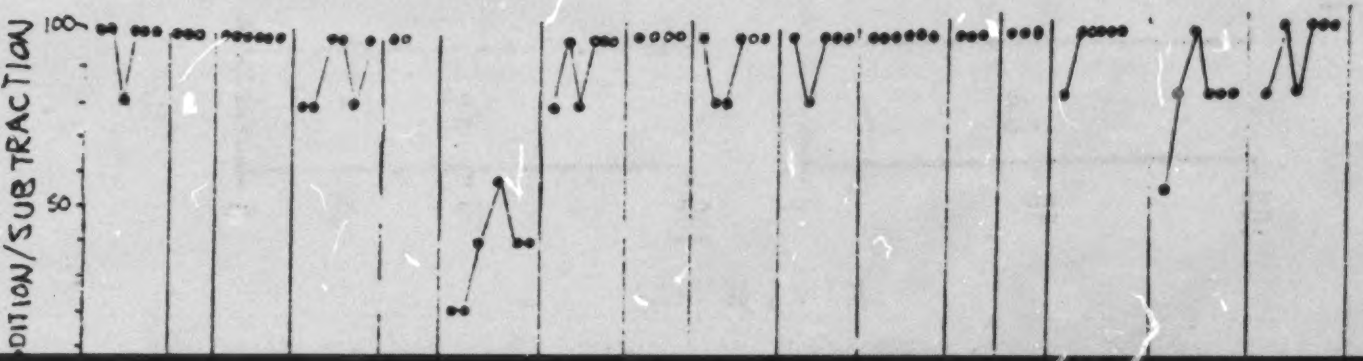
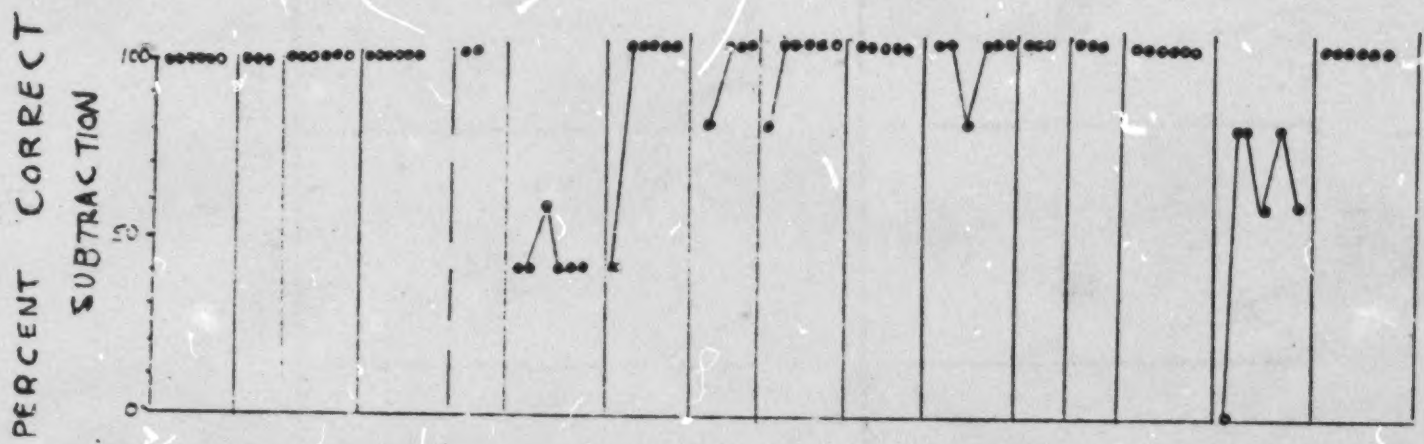
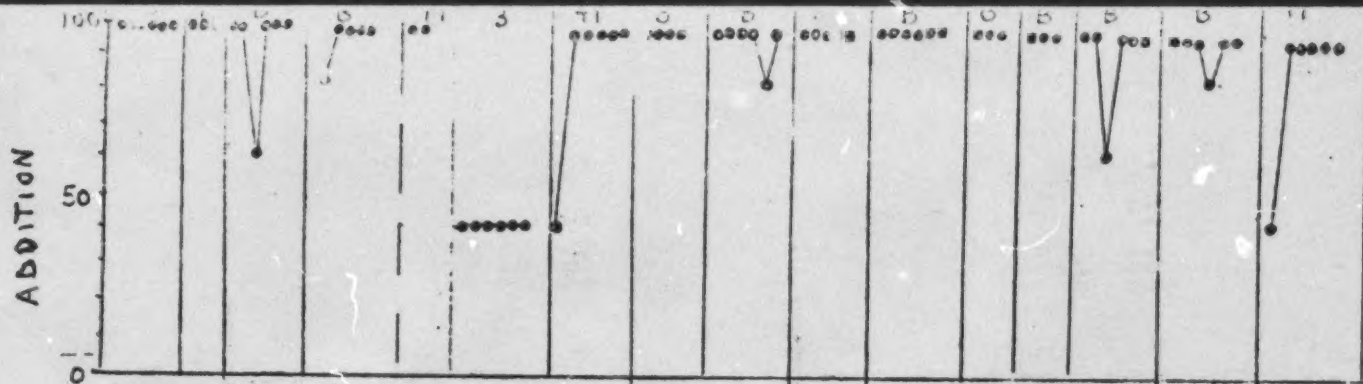


Figure 9

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CHAPTER 6

DATA DECISIONS AND EVALUATION

Our research in instructional procedures has indicated that some basic strategies are effective for most children. However, these strategies are not equally effective for all children at the same time or at all levels of learning. Data collection and evaluation are used to determine the appropriateness of programs and teaching strategies for individual children.

Throughout this book the importance of selecting instructional strategies to fit each child's needs has been stressed. General and specific assessment procedures have been detailed which enable teachers to place children appropriately in programs. If these programs are successful, the child's performance will change and grow until new programs must be initiated and new goals set. He/she will acquire skills, become proficient at using them, and demonstrate an ability to maintain, generalize and adapt these skills. Teachers must take frequent measures of the child's skill in the target area in order to select a program which is appropriate to the child's current skill and learning level. Detailed, step-by-step procedures for collecting rate data in the classroom have been reported previously (Kunzelmann, Hulten, Mingo, Martin & Cohen, 1971; White & Liberty, 1975). In this text some general data collection procedures and methods are suggested.

Data collection is nonfunctional unless it is combined with a rule system which guides decision making based on student performance. This chapter will outline data collection procedures, detail a system for making decisions based on data, and demonstrate the uses of these rule systems.

Kinds of Evaluation

The concepts of formative and summative evaluation are useful to differentiate between change rules. The Webster's New World Dictionary of the American Language (1964) defines the term formative as "giving or able to give form; helping to shape, develop or mold..." (p. 569). Therefore, formative evaluation should give the teacher information which aids in shaping and developing programs which will assist learning.

Formative evaluation helps the teacher decide when to change an instructional procedure or when to introduce a new skill. These decisions are based on the child's actual performance and perceived needs rather than on whim, or superstition or the vagaries of workbook items.

Summative evaluation describes the child's long-term progress. It is a method of summing the child's performance over many small tasks at many different levels. Traditional methods of summative evaluation have involved static measures of performance; one standardized test score,

one post test score or a score of average performance on that skill or a group of skills. These static measures can be useful data-summary tools, but they do not give an indication of the direction or degree of a pupil's growth. As the name implies, summative measures are obtained infrequently, usually at the end of year. They are of little use in planning and evaluating ongoing programs. For these reasons, static measures should always be coupled with dynamic measures which provide an indication of change or growth when used to evaluate performance. Procedures for using dynamic measures will be discussed later in this chapter.

Benefits of Data Collection

The benefits of using frequent and dynamic measures of performance for formative and summative evaluation are apparent for students, teachers and administrators. A student who has access to evaluation scores can observe his/her own progress. Students who fail in school often have poor self-images. Their performance is often compared to their peers by parents and teachers. This comparison is seldom complimentary. When frequent, dynamic measures of performance are used, the child's performance is compared only to his/her previous performance on similar tasks. In this manner, even children who cannot compete with peers can view themselves successful.

When dynamic measures of performance are obtained and programs modified based on these data, students will save considerable amounts of time. Ineffective teaching strategies are quickly noted and changed and effective, efficient strategies based on student performance are located. Little time is wasted by the child "learning" skills he/she already knows. The child is able to move as rapidly as possible through the learning hierarchy for each skill in any sequence.

Teachers benefit from using dynamic growth measures in three ways. First, they are able to continuously assess each student's progress on each targeted skill. These data provide them with valuable information on effective strategies which can be used to teach other skills to that child or other children. Second, these data provide a permanent record of each student's programs, progress and successful interventions. This record facilitates communication with parents, students and other interested observers. It also may be used for accountability, as a teacher has a record of all attempts, successful or unsuccessful, to teach any skill.

Third, dynamic measures of performance when obtained on a continuous (preferably daily) basis are useful for program planning. Assessment and placement data are used to determine each child's current abilities in the learning hierarchy. The choice of instructional procedures is facilitated by determining this level because certain procedures appear to be more appropriate to each level of the hierarchy.

The use of continuous and dynamic evaluation of pupil performance can benefit administrators. The compilation and evaluation of students' performance data in a school or throughout a district can be used to

determine appropriate allocations of resources. Students with slow growth rates might benefit from extra tutoring and smaller classes; students with rapid growth rates could be provided with enrichment opportunities. Children with similar problems and learning rates might be grouped for remedial instruction.

Accurate accounts of individual learning growth can be used by administrators to communicate with parents and the general community on needed funding levels. This type of accountability could result in increased support for school programs. Schools often experience budget cuts long before industry, medicine or other fields. This phenomenon may be related to the concern for accountability. Educators have not been accountable for the monies they have spent. They have not been able to carefully document improvement in their pupils or to pinpoint reasons for failure to improve. Dynamic measures combined with precise program information may help alleviate these problems.

Using Data. It is not enough for educators to collect daily data on precise behavioral pinpoints; they must also be able to use these data to make decisions about each child's program. Therefore, data decision rules are necessary for program planning and decision making. These rules must be simple and flexible to achieve maximum effectiveness and utility. They must help the teacher to do a better job of instructing rather than merely provide additional work.

This chapter will discuss some change rules formulated through the Program Project and related research. These rules are becoming increasingly sophisticated and precise but are still in the process of validation. These rules are not ultimate truths; they are, however, decision rules which have enabled us to devise ways to increase the efficiency of learning. Efficient methods of learning are those procedures or programs which allow children to acquire and use skills more quickly than previously. Decision rules are essentially predictive devices. They are used to predict when or if a particular program will achieve its goal and provide guidelines for modifying and changing programs.

Data Decisions Process

The process of making decisions based on performance data may appear complex and time-consuming at first glance. Once a teacher begins to use this process, however, he/she will find that the procedures are actually straightforward. Figure 1 illustrates a flow chart for making data decisions. The remainder of this chapter will detail each step in this flow chart.

Insert Figure 1 about here

Assess Problem

Before any instruction or remediation can begin it is essential to precisely assess the problem area. When a mother says to a teacher "Johnny can't read," she may actually mean "he doesn't know his alphabet" or "he can't understand what he reads." Procedures for both general and specific assessment are suggested in the chapters on reading, writing and arithmetic.

Place in General Program

Once specific assessment has been completed, the general program will be selected. Often the teacher can find materials, books or programs in a general curriculum library or in a file of successful procedures. If no materials suitable for the child's problem are available teacher-made programs should be devised.

Before data can be collected on any behavior, the behavior of concern must be precisely defined. When a teacher complains that a child is "having trouble learning to read," she may be actually referring to one behavior or a combination of behaviors. The child may actually not be able to decode words. He/she may not even know the names of the letters. He/she may have excellent decoding skills but fail in comprehension tasks. The teacher probably has neither the time nor energy to collect data on all these problems. Instead, he/she should select one or two critical behaviors to monitor. As the child masters each skill, a new behavior can be introduced for daily monitoring. This does not imply that the teacher can only teach one skill at a time. It does imply, however, that he/she will only be confident of the effectiveness of any teaching strategy when data are collected. In order to assess, place, and remediate, it is necessary to define the relevant behavior in terms which allow for precise data collection. The behavior must contain some kind of movement: it must be observable in order to be counted. It must be a behavior the child is able to repeat often enough to take accurate measures and it should have a definite start and stop point or cycle.

Plan Specific Instruction/Intervention

At this point in the data decisions process, the teacher has gained some information which will help determine where the child lies in the learning hierarchy with respect to the skill selected. This information should help the teacher tentatively select an instructional plan for this child. This plan may be altered once data collection has begun.

Select Data Collection Mode and Sample Length

There are many different kinds of data which could be collected on any skill including: rate, percent, frequency, latency or duration. Yet, for most skills there is one type which is more appropriate than another.

Rate as a measure. Rate was chosen as the unit of measurement in most of the Program Project research. For many academic and social skills, rate yields more information than other standard educational measures. Percent scores, most often used in educational settings, provide an indication of the accuracy of performance. Measures of correct and error rates, also, indicate the accuracy of performance. In addition, rate measures give an indication of the fluency of performance. Fluency is often the discriminating factor between a child who has newly acquired a skill and one who is proficient in the use of that skill. Both children might score 100 percent in a test of arithmetic facts, but the former may take 100 minutes to complete 100 problems, while the latter might only take two minutes. Rate data would highlight these differences. The first child's rate scores would be 1 correct problem per minute with 0 errors while the second child's rate scores would be 50 correct problems per minute with 0 errors.

Rate data include measures of amount of work completed or number of behaviors counted and the time in which they occurred. Rate is usually reported in terms of standard units of time: rate per second, rate per minute, rate per day. Rate per minute is probably the most functional unit of measurement in a classroom. When academic and social performance are converted to rate per minute then performance on different tasks can be compared even if they took different amounts of time to complete.

To calculate rate per minute, the number of items completed or behaviors counted is divided by the number of minutes. For example, if Johnny completed 150 short vowel identifications in 5 minutes his rate would be 30 per minute; if Sally talked out 180 times in an hour and a half session, her rate per minute would be 2 ($180 \div 90$ minutes).

An additional advantage to rate data and standard behavior charts is that decision rules have been established which allow for the evaluation of progress once the data have been obtained. These rules help the teacher assess students' performance and predict their future progress if all conditions remain the same. The use of these rules will be explained later in this chapter.

Percent data. There are some academic skills in which percent data are equally or more appropriate than rate data. When a teacher orally reads spelling words to a class taking a test, the children are not free to respond to words as rapidly as they might be able. Their rate is pre-determined by the rate at which the words are said. Percent data would be appropriate in this case for fluency is pre-determined.

Comprehension skills might also be more suited to percent measures. Most teachers are not concerned, nor should they be, with the speed at which children answer comprehension questions. They are, however, concerned with accuracy. Reading comprehension is further complicated by the complexity of the task and the various subskills used in answering questions. A rate measure may reflect the time a child spent reading questions rather than his/her ability to answer them.

Frequency, latency and duration. While percent and rate measures will be used most frequently in the classroom, other modes of measurement may prove fruitful in certain instances. Frequency is simply a count of the number of times a behavior occurs. Frequency data from different days can only be compared to assess improvement if the same time period was used to collect the data.

Latency and duration are both measures of time and are sometimes appropriate for collecting social behavior data. Latency measures the amount of time elapsed between the presentation of a stimulus and the occurrence of the behavior. For example, if Johnny typically wanders around the room, taking the longest route to his seat when asked to sit down, the teacher may choose to take a measure of the amount of time which elapsed between his/her signal to "sit down" and Johnny actually reaching his desk.

Duration, conversely, measures the amount of time a behavior occurs. For example, the teacher might choose to measure the amount of time Johnny remains out of his seat, whether or not he/she has instructed him to sit down. Both measures deal with the amount of elapsed time.

Sample Length

The length of the data collection period must also be considered. Two issues help teachers decide appropriate sample lengths: efficiency and effectiveness.

For data collection to be efficient, the sample length (that is, the amount of data collected on any one task) must be kept small. A teacher with twenty to thirty children cannot collect an hour's worth of reading data on each child; he/she can, however, collect one or two minutes samples of a child's ability to read.

In order to be effective as a decision tool, however, the sample must be long enough to gain information about the child's ability to perform. The length of sample required is dictated by the behavior. For a high rate behavior, like reading orally, a very short sample is sufficient if the initial rate is at least ten behaviors per minute. For a behavior which is performed at a lower rate such as talk-outs or out-of-seats, the sample length should be long enough to gain a behavior count of at least ten. For some children, a half-hour count would be sufficient; for others, the teacher might want to tally the occurrence of a behavior all day. At least ten behaviors should be counted, however, in order to be able to observe change. A behavior sample in which only two or three behaviors occurs leaves little room to see improvement.

Set Static Aim

Before the data collection begins, some determination of criterion performance should be established. The teacher and child should both have some idea about when the skill will be considered learned. This

goal is essential for making decisions from data. There are five methods for setting these static aims.

Previous performance. For some skills it is reasonable to expect pupil performance to attain similar levels when the materials or class of problem is changed. The teacher may use the previous performance of the pupil on similar materials to indicate the present static aim. For example, if a pupil reached a rate of 30 correct numbers per minute on basic add facts with sums to 10, it is reasonable that 30 numbers per minute could be used as the static aim for computing basic add facts with sums to 20.

It is possible, however, that the pupil's previous performance was not a proficient rate; that is, a rate of sufficient speed to enable the pupil to use the skill to build other sequential skills. The previous performance rate may also not have been indicative of a student's actual ability. If the static aim is set too low the child may actually perform down to the aim. In addition, aims set on previous performance may be inappropriate for new skills. For example, a static aim based on performance on addition facts may be inordinately high for division facts. Adults perform at different rates on these tasks, therefore we would expect students to perform differentially.

Adult to child proportional formula. Martin (1972) argued that a proportional relationship exists between basic tool skills rate (e.g., writing numbers) and performance in a class of problems which utilize the skill (e.g., writing numbers to answer arithmetic problems). If this is so, then pupils' desired static aims can be determined using 1) the adult's tool skill rate, 2) the adult performance rate, and 3) the pupil's tool skill rate for a specific problem class.

$$\frac{\text{Child's rate}}{\text{Child tool skills rate}} = \frac{\text{Adult performance rate}}{\text{Adult tool skill rate}}$$

For example, an adult may write random numbers at a rate of 120 per minute and write numbers in response to problems at a rate of 60 per minute. A child has a tool skill (write number random) rate of 60 per minute. According to the proportional formula, the pupil's static aim should be 30 per minute ($30/60 = 60/120$). If this formula is used, more than one adult should be sampled to establish a "fair" proportion.

Peer comparison. When peers are comparable in learning patterns, rates and performance levels, then it may be reasonable to expect comparable static aims in the same materials. Richard and Spiro are both reading in the same curricular series, and have in the past demonstrated similar abilities. If Richard met his static aim of 100 words per minute with 2 errors in book #14, then a similar aim could reasonably be set for Spiro when he begins to read in book #14.

There are some cautions when using peer performance to set aims. Each individual is unique. Two peers may be similar in many respects yet each will retain some differences. Setting guidelines based on one child's performance may result in expectations too low or too high for the other child.

Functional rates. Some skills are influenced by the performance level on prerequisite skills. When the rate of performance in that prerequisite skill facilitates advancement to the next sequential step in the curriculum or success on that task in another setting, that rate can be identified as "functional". The functional rate may be used as a static aim.

Functional levels are identified by monitoring performance data. When the data reflect success at a sequential skill when a specific desired rate has been reached, and failure at that skill when a lower rate was accepted, the required rate that enabled the next step to be successful is the functional level.

For example, Ms. Bosely assigns her class selections from two comparable reading texts. In each reader, she obtains two-minute oral reading samples from each student. In one text she finds that setting a desired rate of 40 wpm with 5 or fewer errors to move to the next story results in a seven day phase median score of 15 correct wpm and 15 error wpm in the new story. For the other text she finds that a desired rate of 80 wpm with 2 or fewer errors results in a seven day phase median score of 65 correct wpm and 4 error wpm in the new story. She has identified the functional static aim for maintaining success in reading for her pupils as being near 80 wpm correct with two or fewer errors.

Functional rates for groups of children are still inadequately researched. It may be that functional rates will vary from child to child.

Normative data guidelines. When individual data are collected for a large number of children on the same skill, the central tendency rate may be used as a guideline for setting a static aim. Analysis of computer storages of data from children of a homogeneous group working on the same skill will indicate what score represents central tendency. There are other, non-computerized methods of analyzing large groups of data, but all require a large sample of the population and skill in question, and an organized system for processing the acquired data.

Normative data do not represent individual functional levels of performance, and should not be assumed to be appropriate for all pupils similar to those in the sample population. Also, there is no evidence that guidelines established for a specific population at a specific grade level may be used to generalize to other populations.

Minimum number of days at static aim. Part of any static aim should include the number of days at aim required before the pupil moves on to the next skill. Some initial data indicate that two consecutive days at aim will result in better retention of the skill than only one day (Eaton & Swenson, 1973).

Collect Data for Three Days

After the appropriate sample length has been chosen and the instructional procedure selected, the teacher should begin to collect

data. At least three days of data must be collected before any decision is made. This time is often the hardest for teachers. If there is no improvement in one day the teacher may be tempted to discontinue the program and design a new one. In all fairness, however, sufficient data should be obtained to allow for improvement or change.

Sometimes, teachers will want to take a few days of data before initiating instruction. This pre-instruction period is called a baseline and gives a reference point to judge future progress. Instruction can begin without this baseline period, but the teacher and child will never be certain if instruction was necessary. The baseline period permits children to teach themselves, or to attempt to improve their skills through repeated practice.

Evaluate

Data are evaluated after the first three days of data have been collected. As Figure 1 indicates, three decision choices are possible at this time. Each decision is based on different criteria.

No. A no decision means that the teacher has decided to discontinue the program because it is failing. There are two criteria for making a no decision based on three day's data: 1) if the first three days of data are at zero even after instruction has begun, or 2) if performance deteriorates. That is, if on a behavior you wish to decrease, (such as talk-outs) the second day's rate is higher than the first and the third day's is higher than both (See Figure 2). Both these data patterns would indicate that some change is necessary.

Insert Figure 2 about here

If a child is unable to perform the assigned task during the first few days of data collection, the teacher has three options. First, he/she should determine whether the child has the prerequisite skills for the program. If a child has not yet learned to count, subtraction with borrowing may be inappropriate as a curriculum for him/her. This may seem obvious, but it is an option often overlooked. Teachers assume that a child who has passed the second grade can perform skills taught at that level. If the student exhibits the ability to perform on prerequisite skills, the instructor may choose to continue with the planned instructional sequence or he/she may choose to "slice back."

"Slicing" involves taking a large instructional task and slicing it into its component parts (Hansen, 1973). A teacher who observes a child struggling with a task during the first days of instruction may feel that, although the child has the prerequisite skills, the task is still too difficult. Therefore, he/she elects to teach the task in its component parts and then help the child put the entire task together. A child who cannot remember the "multiplication table" might be encouraged

to learn just the "x1's," then the "x2's," and so on, until he/she has mastered all the multiplication facts. Similarly, a child whose creative writing is unclear, full of sentence fragments and dangling participles, might benefit from practice in writing single sentences which could later be developed into paragraphs, short stories, or novels.

If the child does demonstrate some behavior and has the prerequisite skills but his/her performance indicates that the program is not successful, then the teacher's options for change are as numerous as his/her imagination will allow. A myriad of variables could be changed: the materials, the length of the time sample, the instructional technique, the drill procedure, the reinforcer, or the mode of response. No matter what the decision, however, the same data decision process is repeated. Three more days of data using the new procedures are collected and evaluated.

These three day change rules are not applicable to baseline conditions. In order to use a baseline to predict or compare with future growth, data must be collected for at least five to seven days.

Exit. An exit decision is made if the child reaches his/her static aim. Usually this will take longer than three days of data collection. Teachers will spend many instructional hours and children will practice and drill diligently before the aim is met. Sometimes, however, the aim is met early in the program. The child catches on to something he/she has previously not understood. At this point, the teacher and child should begin to work on a new skill. Periodic checks of the child's maintenance of the skill should be scheduled.

Yes. If the child has not met his aim, but is performing above the minimum standards discussed under "No" earlier, then the decision should be made to stay in the program and continue. This decision leads to the next steps in the data decisions flow sheet.

Set Dynamic Aim

If the teacher continues the current program, the next step is to set a dynamic aim. The dynamic aim is a statement of the minimum improvement in performance necessary to achieve the static aim within a specified time limit. If a child begins reading 20 correct words per minute (wpm) with 12 error wpm and his/her static aim is 90 correct wpm with 2 error wpm within three months, certain minimum daily improvements must occur to attain the static aim.

In the absence of dynamic aims, teachers tend to rely on guesswork to predict whether static aims have any probability of being met. The purpose of dynamic aims is to reduce or eliminate dependence on subjective analyses and to simplify the decision making process. Rules for setting dynamic aims differ for rate and percent data so they will be discussed separately.

Dynamic aims: rate data. Dynamic aims can be determined for rate data in three ways. All methods begin by determining the intersection of the middle day and middle rate of the first three days (See Figure 3).

Insert Figure 3 about here

The first method of setting a dynamic aim is to draw a line which connects the intersection of the middle day and the middle rate of the first three days with the static aim rate date (See Figure 4). This method is used if the static aim and a desired date for reaching that aim have already been chosen.

Insert Figure 4 about here

If the desired static aim rate is known but a date has not as yet been chosen, the child's previous performance on similar academic tasks can be evaluated to determine a "typical" growth or "line of progress" rate. This line of progress is used as the dynamic aim. The desired aim date is indicated by the point at which this line of progress intersects the static aim rate (See Figure 5). (Details for determining a line of progress will be described later). If the date for termination of the program has been pre-determined and the child's typical line of progress is to be used, then the static aim is determined by the intersection of the dynamic aim line and the target date. (See Figure 5)

Insert Figure 5 about here

If none of the previous methods appears to be useful, the teacher may set the dynamic aim arbitrarily at $X \pm 1.25$. This complicated number simply means that the child's dynamic aim is to increase (or decrease) his/her average performance per week by one fourth. Therefore, if the child's average correct rate is 20 for the first week of data collection, he/she should average 25 (20×1.25) for the second week or 15 ($20 \div 1.25$) for an undesired behavior. This figure was suggested as a minimum dynamic aim by White and Liberty (1975). After analyzing thousands of successful and unsuccessful projects White and Liberty concluded that most children should maintain a minimum change of $X \pm 1.25$ per week in order to successfully learn most skills.

If the standard behavior chart is used, the $X \pm 1.25$ line is drawn as a straight line. If not, the calculations for minimum growth can be computed by hand using the first three days' data.

This same formula can be used for any desired dynamic aim (X3, X10, +1.7). The 1.25 line should be used only when the teacher has no other data from which to select a desired aim. The 1.25 line represents minimum, not maximum, levels of acceptable growth.

Dynamic aim: percent data. Four methods have been used at the Experimental Education Unit for setting dynamic aims based on percent data. These methods are still in the process of experimentation but are included to suggest ways in which percent data can be used to set dynamic aims.

The first method is merely concerned with daily improvement. Each day the data are checked to see if the student has performed as well or better than the previous day. This method keeps the teacher apprised of the current progress of his/her children. One disadvantage of this method is that it does not allow for natural variability in learning performance. Learning does not occur arithmetically or geometrically. If the teaching procedure is altered each time performance fluctuates children may be subjected to a constantly altering teaching methodologies.

A second method for setting dynamic aims for percent data is to compare improvement over three-day periods. After the first three days' data are collected, 30% of the average rate is calculated. (If the average rate was 12%, then 30% of that rate would be 4%). This figure is used as the dynamic aim. Each three days, the scores are averaged and compared to the average of the previous three days. If the former is 4% greater than the latter (30% improvement) then the program continues. If not, a change is made. This method insures minimal growth, and allows for daily variation in performance. It also sets the dynamic aim based on a student's entering behavior. A student whose entering level of performance is quite low is not required to make as rapid growth as one who already has some skills.

The third method uses a 30% dynamic aim, but the criteria vary each time data are compared. If the average of the first three days of data is 12% then a 4% increase is required for the second three days. If the average for the second three days is 21%, a 7% growth would be required for the following three. Therefore, as the child becomes more skilled, the increments of growth become more stringent. This method most closely resembles the dynamic aim described for rate data.

The final method used for setting dynamic aims is to use adjusting criterion. This method was described in detail in chapter 5. Simply stated, benchmarks are preset to use in evaluating each successive three days' average performance. The student must average over 53% correct performance in the first three days of teaching. In the second three-day period he/she must average 90% correct. Finally, the static aim of 100% correct must be met in the next three-day period. Adjusting criteria have been used successfully in math and spelling acquisition.

Two cautions should be mentioned if dynamic aims are used with percent data. First, as the child's performance approaches 100%, he/she

may not be able to meet the improvement criteria. For example, if the previous three-day average is 95% and the dynamic aim is 10% improvement, the student has no chance to increase the required percentage. Percent data, unlike rate data, have a ceiling; a point where the child's performance can no longer improve. Second, the sample size itself may determine the minimum amount of growth possible. The number of behaviors counted per sample controls the maximum degree of improvement. If only 10 math problems are completed each day, the child can only improve in increments of 10%. If the sample has 25 problems, the smallest possible increment of growth is 4%; if 50, 2%. If percent data are used, the sample size should always be large enough to insure that small increments of growth can be observed. In addition, the sample size should remain identical from day to day so that the possible increments of growth are also identical.

Collect Three Days' Data

Once the dynamic aim has been determined, either for rate or percent data, three more days' data should be collected. Three days appear to be a minimum to permit the teacher to observe performance changes.

Evaluate

After the next three-day period of data collection the program is re-evaluated in the same manner as described previously. An "exit" decision would be made if the child's performance is at or above the static aim. A "no" decision is made if the child's performance falls below the dynamic aim. A "yes" decision is required if the child's performance falls within the limits of the dynamic aim. The ramifications of these decisions have been previously discussed.

The use of the dynamic aim for decision making has been described for percent data. If rate data are selected, an additional set of rules has been prescribed. Again, a three day criterion is used. If the child's daily performance scores fall above the dynamic line for an inappropriate behavior or below the line for a desired behavior for three consecutive days, a change should be made (White and Liberty, 1975). Figure 6 depicts an example of this phenomenon. Potential program changes are far too numerous and complex to list here. They are limited only by the teacher's inventiveness. A variety of programs and changes are suggested in the subject matter chapters.

Insert Figure 6 about here

Collect One More Day's Data -- Evaluate

If after the second three days of data are collected the teacher makes a "yes" decision and decides to continue with the current program,

then the decision to stay with or change the program is made daily. The rules are the same; if the child's data fall below the dynamic aim line for three consecutive days, then a change must be made. Whatever change is made, the teacher should repeat the procedures followed to evaluate the first intervention; collect three days' data, evaluate, set dynamic aims, collect three days' data and evaluate.

Another Dynamic Aim Rule

Flow lists. A procedure for introducing tasks in a flow list rather than fixed a list was discussed in the chapter on writing. This method was developed for spelling instruction but may be adapted to other skills such as basic math facts. McGuigan (1975) found that success in learning to spell words was most often achieved if the child passed an average of one word a day. This minimum performance level insures that the child is achieving some success each day. If the child is not achieving at this minimum level, there are two options: 1) the instructions or reinforcement could be changed, or 2) the number of words or problems presented each day could be reduced.

If more than one word a day is being passed, the teacher could opt to increase the amount of work given each day. Our initial data (McGuigan, 1975; Bennett, Baird, & Metcalfe, 1975) indicate that to insure passing an average of one word a day (with a two consecutive day static aim) and good maintenance rates, a student should maintain an average of 50% correct on each daily list.

How to Summarize Data for Reporting and Analysis

The purpose of a summary is to determine what actually happened in a particular program compared to what the teacher hoped would happen. This type of data summary is useful for two reasons: 1) comparisons can be made of the effectiveness of different procedures, and 2) results of instruction can be reported to the child, parents, other teachers and the administration. There are a number of acceptable methods for summarizing data.

Medians. Medians are often a useful tool in making data decisions. A median is the central point if all scores are rank ordered.

Often medians are preferred to means because they describe the student's most typical performance. A median, unlike other measures of central tendency, cannot be skewed by one exceptionally good or bad day, and can be used for any kind of data. Medians can be figured either from the chart by finding the middle plot and counting from lowest to highest rates, or from the raw data by rank ordering all plots and finding the middle score. However, medians are a static measure of performance and do not necessarily reflect growth patterns. The median scores from two sets of data could be identical, yet in one condition the child could have improved greatly while in the other, failed. Median scores merely reflect a midpoint of the data. Although they are

a useful data summary-decision tool they should be used in conjunction with measures of growth such as lines of progress.

Means. Means are a second commonly used measure of central tendency. Means reveal the average performance of a student rather than typical performance and can also be used with any kind of data. Means are calculated by summing the values for all data plots and dividing the sum by the number of data plots. Means, like medians, are static measures and should be used with the same cautions.

Lines of progress. Because each data plot, and even a median or mean score, is a static measure of performance, lines of progress should be drawn to indicate each pupil's growth pattern. A line of progress is a line drawn through the data which shows the average growth throughout the phase. (Note: A phase is the term applied to the period of time in which an intervention was in effect.) It differs from the dynamic aim line in that it describes a student's actual progress rather than his/her desired progress. Two methods for figuring lines of progress are used most often: quarter intersect and quickie split middle. These procedures can be used only when the data are plotted on ratio paper.

1. The quarter intersect method (QI) of figuring the line of progress includes four steps: (1) divide the data plots into two halves; (2) find the middle trial (or plot) of each half; (3) find the median rate of each half, and (4) draw a line between the point of intersection of 2 and 3 of each half. The slope of this line indicates the rate of change per week. For example, a QI x2 line means the scores are, on the whole, doubling each week. This method of calculating the slope must be used only to describe the current rate of growth. Another kind of line of progress may be figured which provides a predictive as well as descriptive statement of rate of change.

2. When a line of progress is figured using the Quickie Split Middle (QSM) method, the same procedures are followed as for the QI line of progress. In addition, however, the line of progress is adjusted up or down (keeping parallel to the original line) so that half the data points fall above the line and half below. This line of progress, when extended into the future (if based on enough days data) can be used as a predictive tool. If the condition has remained in effect for between 7 and 11 days, the probability of the child continuing to progress along the same line ranges between 95% and 97% twenty days into the future (White, 1972). This predictive value of the QSM line of progress allow a teacher not only to evaluate the current progress of the child, but also to predict if that rate of growth is sufficient to reach the desired aim rate and date.

White (1972) also suggests that after 11 days' data are collected the predictive powers of the QSM do not increase. If the teacher is analyzing a lengthy condition (or phase), the line of progress should be figured on only the last 11 days' data. Templates have been constructed to determine slope of a line without lengthy calculations. (Experimental Education Unit, 1974)

Start rate, end rate. Start rate -- end rates can be useful descriptive figures to use when comparing the data from two different conditions. Start rate -- end rates are not the same as first and last day of data in the phase. Instead these terms refer to the points where the line of progress intersects with the phase change lines. To insure accurate figures, the phase change line must be placed one-half day before the first day of the change (See Figure 7).

Insert Figure 7 about here

Step. A step score indicates the amount of change which occurs immediately after a phase change and can be useful in comparing immediate effectiveness of different interventions.

The following procedures are used when calculating a step score:

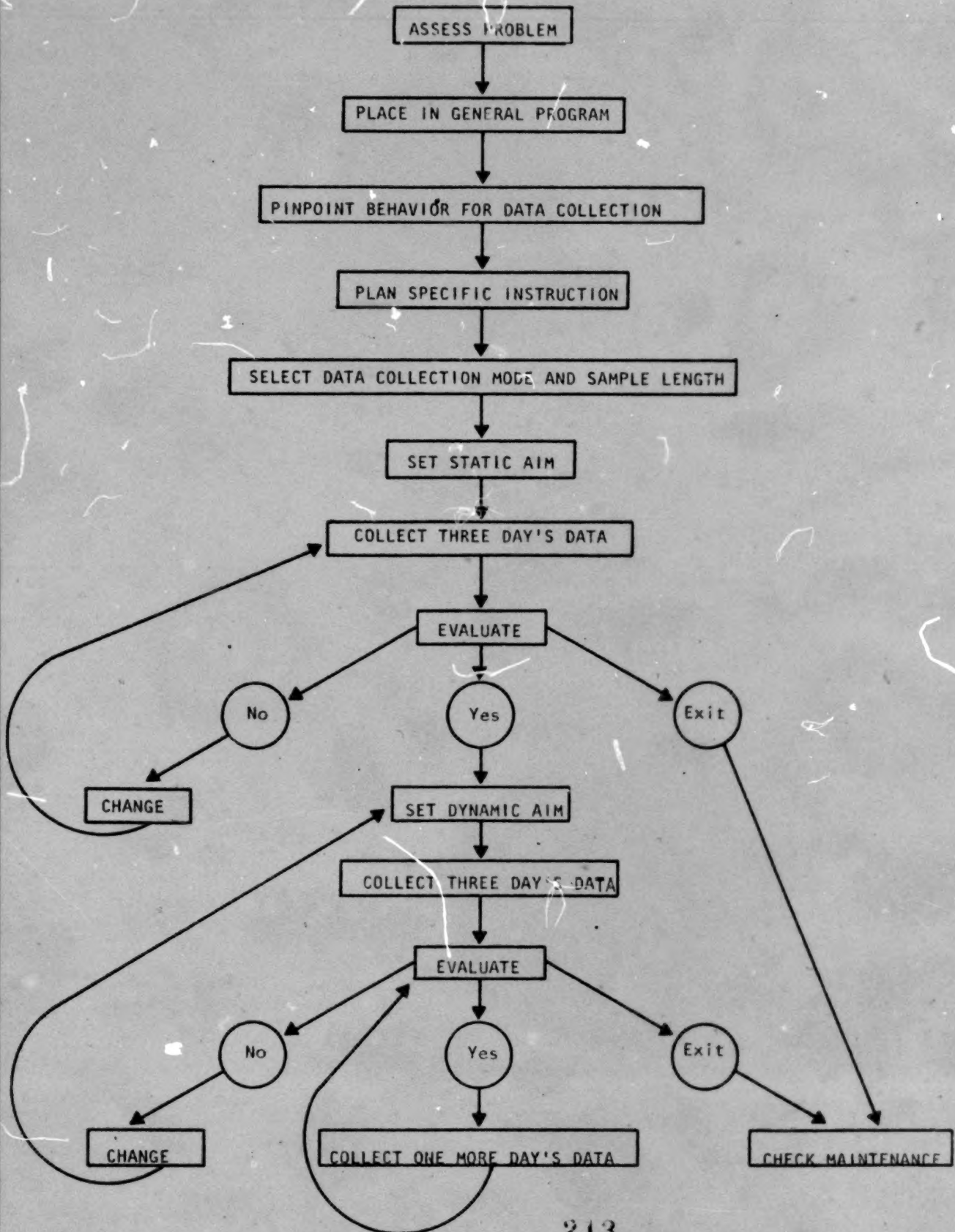
- 1) calculate the end rate of the old phase and the start rate of the new phase,
- 2) divide the larger by the smaller,
- 3) label $\times$ if the step is in a desired direction,
- 4) label $\div$ if the step is in an undesired direction.

Summary

This chapter has briefly suggested commonly used data decision rules and data summary suggestions. More information on this subject is available. Interested readers are referred to a chapter by Owen White and Kathleen Liberty, Behavioral assessment and precise classroom management (1976), to a Working Paper by the same authors, Practical classroom measurement: Precision teaching (1975), and to a volume by Owen White and Norris G. Haring, Exceptional teaching: A multimedia training package. These authors have written perhaps the most comprehensive instructional materials on data decisions. They describe in great detail procedures for using daily data for decision making and summarization. Precision teaching: An initial teaching sequence (1971) by Kunzelmann, Cohen, Hulten, Martin and Mingo is another useful document, although somewhat outdated.

The most important thing to remember, however, is to use decision rules. The rules suggested in this chapter are in the early stages of development. They are suggested as guidelines rather than ultimate truths. Rules should help the teacher do a better job of instructing the pupils in his/her charge. If they are not serving that function, or if they seem too difficult to use, the rules should be changed.

Figure 1
DATA DECISIONS FLOW SHEET



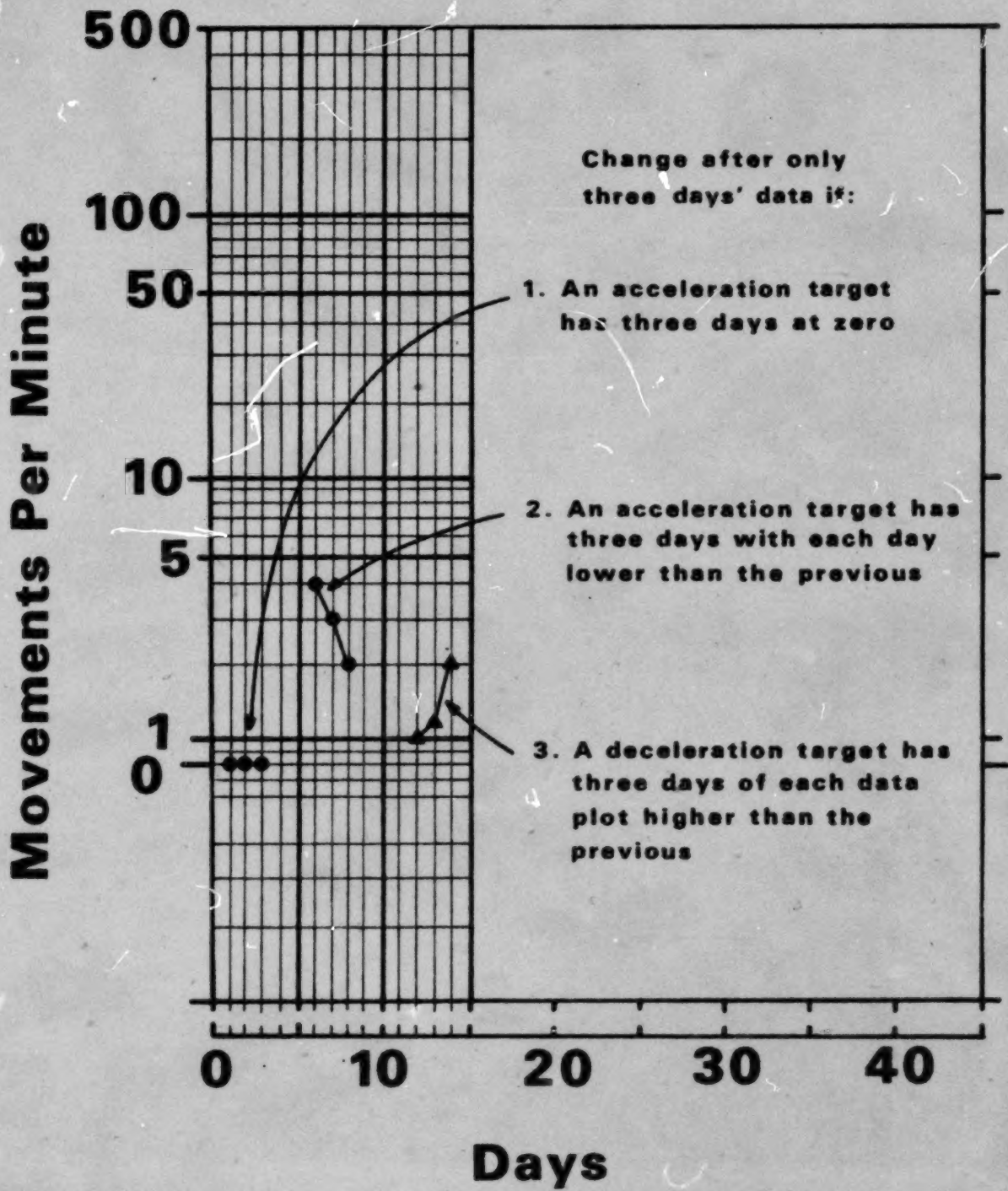


Figure 2

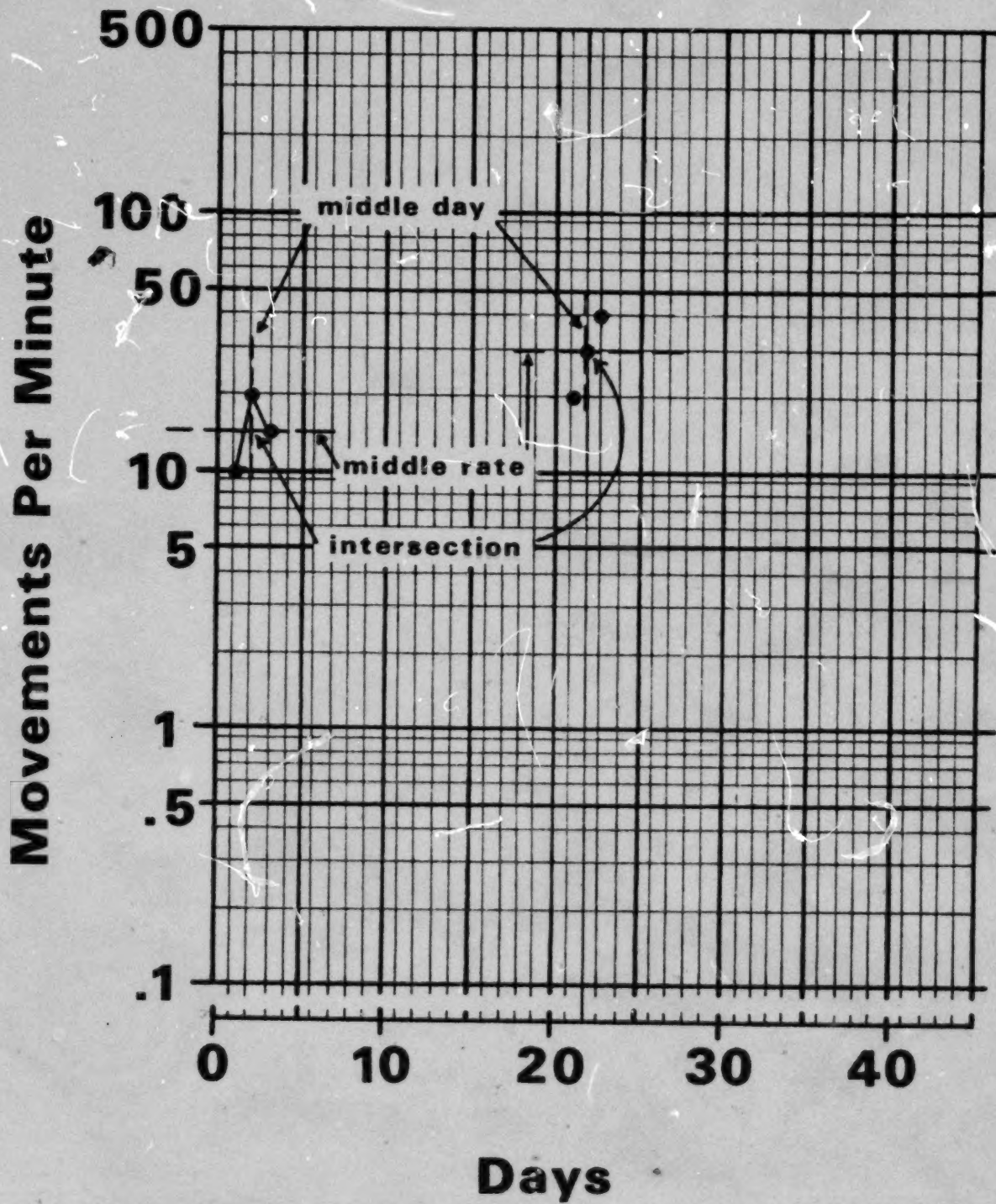


Figure 3

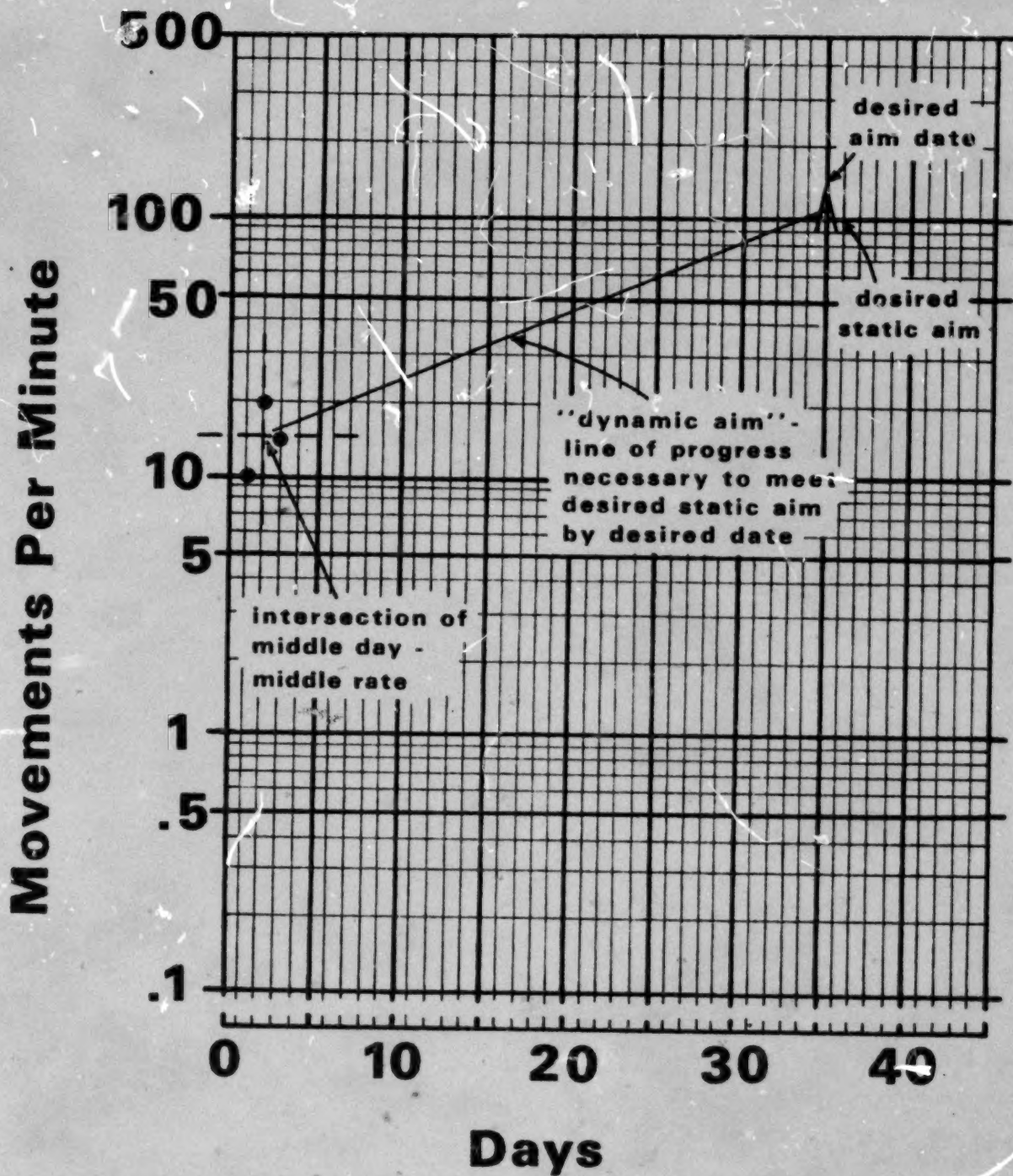


Figure 4

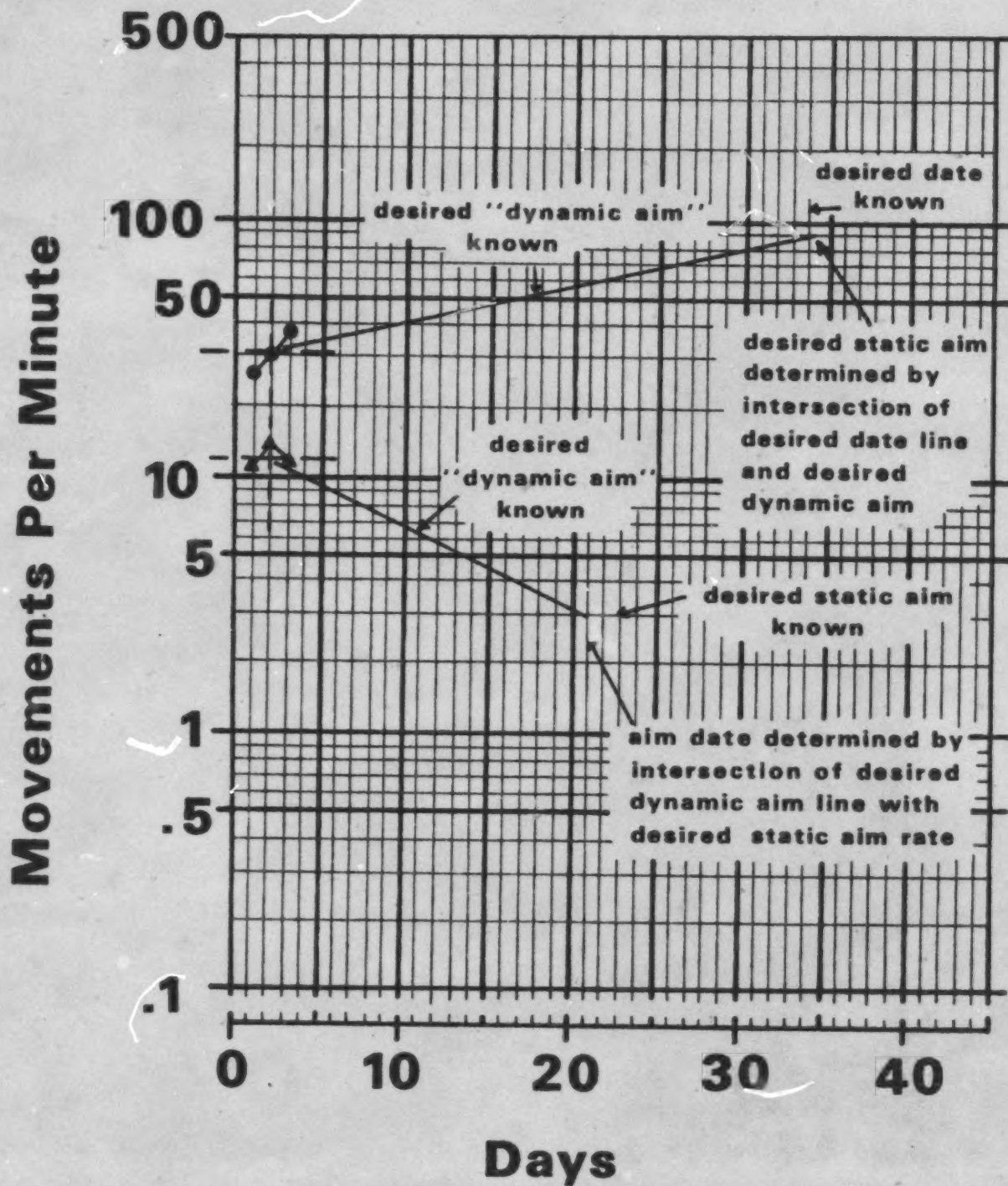


Figure 5

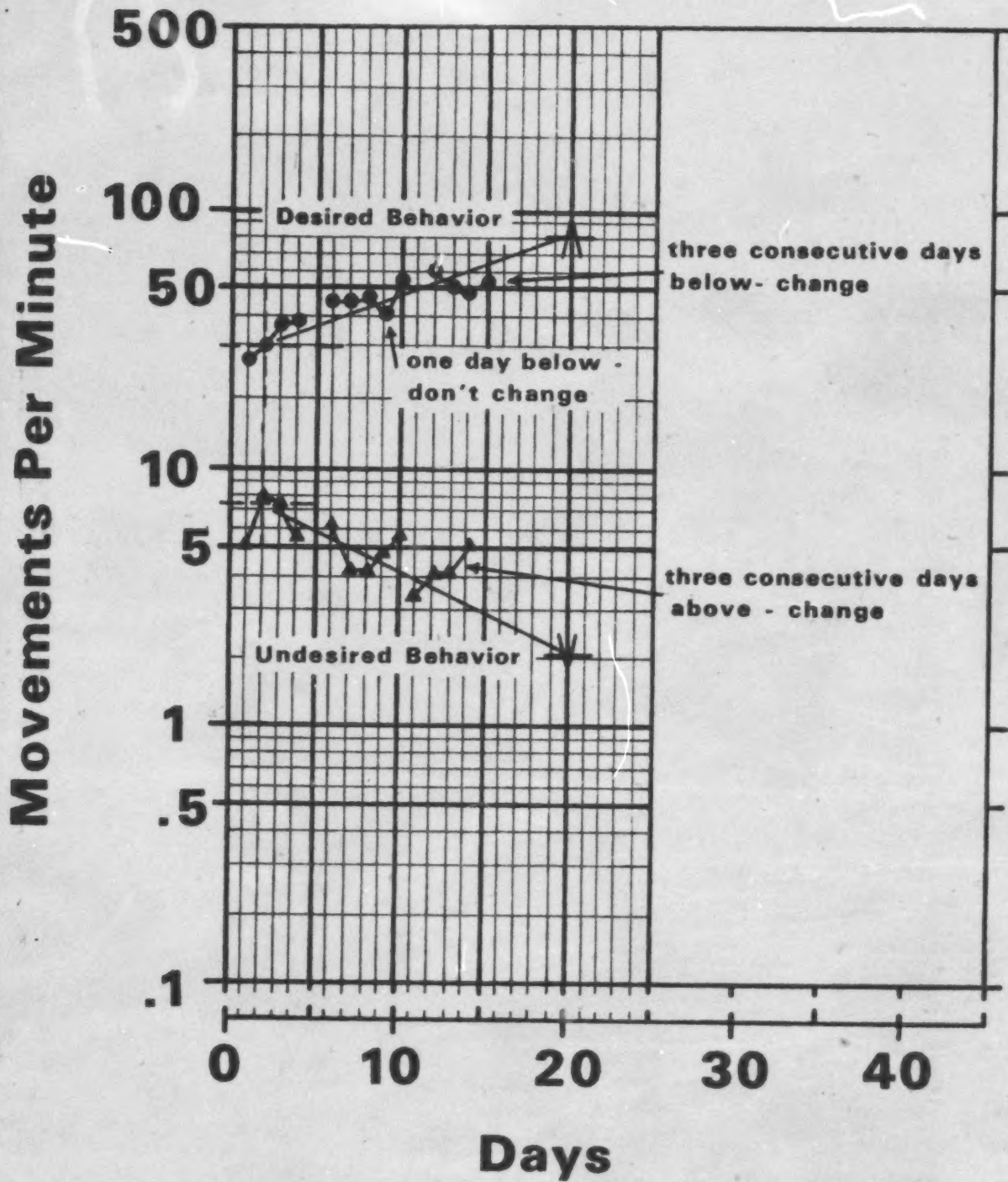


Figure 6

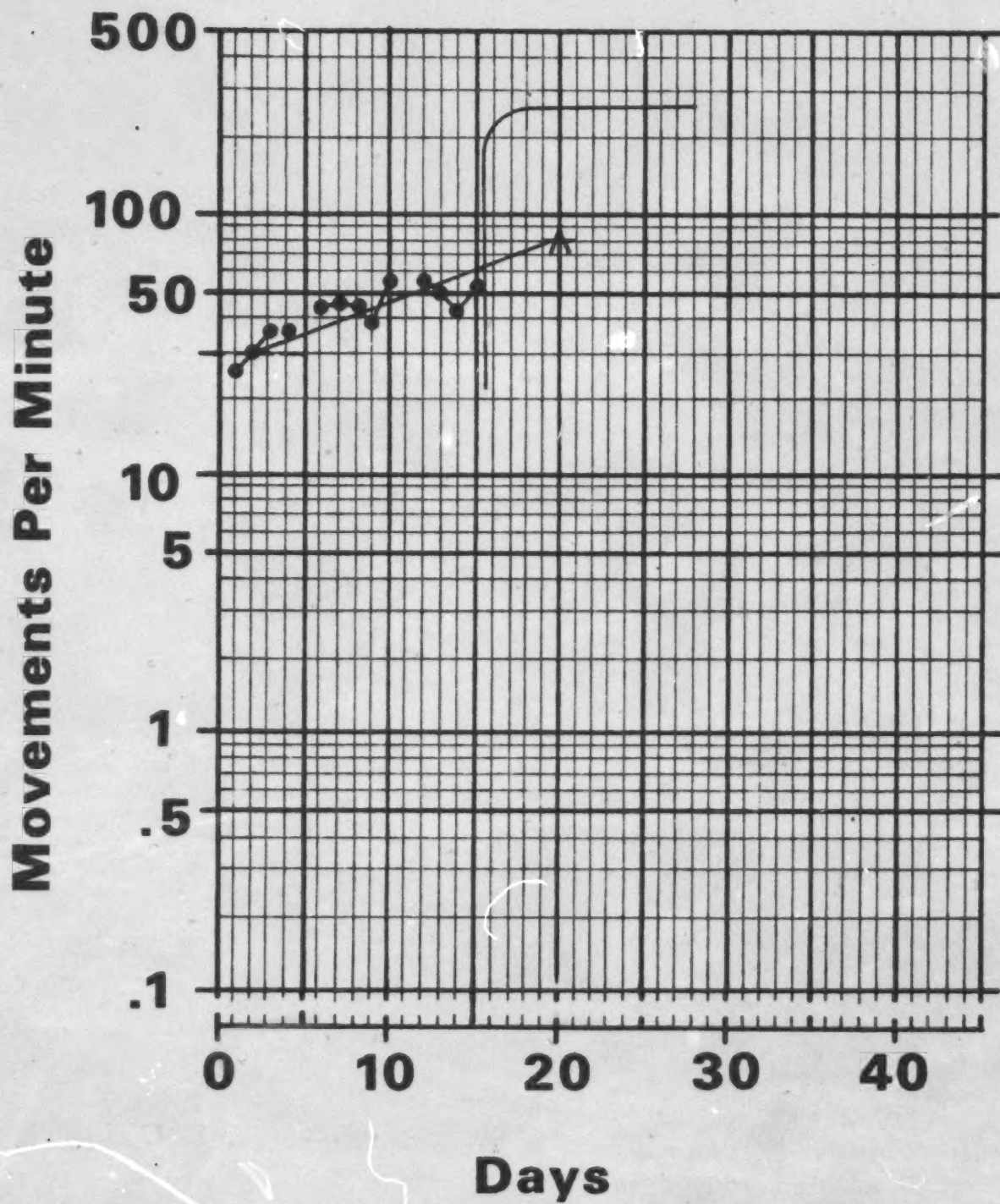


Figure 7

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CHAPTER 7

CLASSROOM ORGANIZATION AND MANAGEMENT

Most teachers recognize the need for individualization and precise data collection but are overwhelmed by the management aspects of such an endeavor. Complete individualization for all children in all programs is unfeasible in most classrooms because of time and personnel constraints. However, given proper organization and management, teachers can individualize their classrooms to a far greater extent than is currently the case. Students can work on different materials at different levels and rates while instructional time is devoted to individuals and small groups.

The benefits of individualization are incalculable. When children are appropriately placed in meaningful materials, teachers know the children are learning needed skills. When children are allowed to learn at their own rate, teachers are assured that students are mastering skills rather than merely becoming introduced to new concepts. When children are provided with appropriate teaching programs, teachers know their students are learning in a manner which best suits them. Most important, when classrooms are individualized and data systems employed, both students and teachers can experience success. Students actually learn and can take pride in their accomplishments. Teachers are confident that each child is receiving the type and amount of instruction that will be most beneficial.

Teachers who have learned to individualize programs seem to maintain a smooth-running classroom with very little effort. They answer questions, instruct children, and praise good work rather than admonish, scold, locate work sheets, find chalk, or correct yesterday's papers. The quiet hum of students engaged in purposeful learning noted in well-managed classrooms reflects careful pre-planning and organization. Most teachers have developed efficient methods for managing classrooms through years of experience and desperation. Teacher training courses are a potential source for learning the skills. Unfortunately, most education classes concentrate on theory and material but provide few tips for classroom organization and behavior management. Teachers must learn how to run a classroom by reading articles, observing and modeling the methods of successful classroom teachers, and through experience. This process is sporadic, non-sequential, and time-consuming.

The focus in this chapter is on suggestions and ideas for classroom organization, behavior management, and efficient use of available resources, written with the hope that readers will want to implement many of them. Some ideas will support existing classroom practices and are common sense procedures. Others may be innovative or unusual. All these suggestions are based on actual classroom experience, and many are substantiated by research.

Individualization often fails when teachers renovate an entire classroom or attempt too many new techniques simultaneously. Teachers who wish to implement individualized programs are advised and encouraged

to change one subject area or program component at a time. Rapid change can result in an overload of work and subsequent disillusionment when work-saving strategies are not concurrently developed. On the other hand, slow change helps teachers become convinced of the ultimate rewards of effective programming and individualized instruction.

This chapter is divided into two major areas: behavior management and academic organization. The "message" in behavior management is: "small is good." This means that teachers should not use complicated behavior management systems when simpler systems will work. Therefore, token reward systems are not instituted unless other management methods fail. Research findings will be discussed in three areas: 1) how a teacher's behavior affects students, 2) ways students can manage their own behavior, and 3) uses of external management systems such as tokens, rewards, and behavior games. In the section on academic organization, specific suggestions are made for developing master plans, managing multiple programs simultaneously, and utilizing resources efficiently.

Even though these aspects of management are discussed separately, they are interrelated. Learning cannot occur in the absence of some constraints on behavior. However, quiet classrooms do not necessarily imply that learning is occurring.

Behavior Management and Planning

Most teachers recognize that children cannot learn while they are misbehaving. It is difficult to keep thirty children occupied on one task; it is even more difficult to manage thirty children on thirty different tasks. Providing a few rules for classroom behavior and consistently applying management tactics is essential to bring order out of chaos and to provide an environment conducive to learning.

Some days everyone in the classroom seems to misbehave. Some children never seem to comply with any request or to manage their own behavior so they do not infringe on others' rights. Effective ongoing behavior management programs can reduce the headaches these seemingly inevitable problems cause.

There are three approaches to developing systems to encourage appropriate classroom behavior: teacher management, self-management, and behavior games or group contingencies. Teacher management includes all the components of a teacher's behavior which affect students' actions. Self-management provides students with techniques for controlling their own behavior. Finally, behavior games provide a bridge between these external and internal systems. Any combination of these approaches can help foster a learning environment.

Teacher Management

Be positive. It is easy to notice things children do wrong. A child who hits gains attention; the child who errs on his math problems

is corrected. However, when the room is quiet, teachers may neglect to compliment students for working appropriately. Effective teachers notice and comment on the positive things that happen in classrooms as well as attending to misbehavior.

Positive forms of teacher attention (such as praise) help children learn and maintain appropriate behavior. Investigators have documented case after case of "naughty" children learning to be "good" children as their teachers learn to be positive (Becker, Madsen, Arnold, & Thomas, 1967; Allen, Hart, Buell, Harris, & Wolf, 1964; Ward & Baker, 1968).

"Good" teachers, teachers who have a low rate of pupil misbehavior in their classrooms, tend to have a higher rate of positive than of negative interactions with their children, regardless of their background, training, or philosophical orientation. These teachers still correct errors, reprimand misbehaviors, stop fights, and keep children after school. However, they also notice and remark when children are sharing, working quietly, raising their hands, answering questions correctly, or discovering new concepts. These teachers interact with their pupils in positive ways many more times than they use reprimands (Becker, Madsen, Arnold, & Thomas 1967; Hall, Lund, & Jackson, 1968).

Positive interaction does not imply that teachers always say "good boy" or "good girl." Verbal praise can be varied and precise. Moreover, there are positive non-verbal interactions: a smile, a touch, a hug, a correct mark on a paper all give a child feedback about something he has done correctly. These types of non-verbal praise are extremely effective when combined with verbal comments for increasing appropriate classroom behavior (Kazden & Klock, 1973).

Praise should be specific rather than general. A teacher who says "That's a good boy" to a preschooler who has just handed a block to a friend may actually be reinforcing the child's current thought about grabbing the truck away from another child. A more specific comment such as "I like the way you are sharing your toys" or "That was nice of you to give Tommy the block" is more likely to reinforce and strengthen the desired behavior, i.e., sharing.

Maintaining a positive emphasis in the classroom has three advantages. First, most children enjoy teacher attention and approval. They are likely to behave in positive ways when teachers compliment them for acting appropriately rather than always reprimanding children who misbehave. Second, a teacher who smiles and says pleasant things to children may feel better about teaching (and may provide better instruction) than one who spends the entire day scolding. Third, difficult children can become enjoyable when the teacher finds positive behaviors to reinforce. This metamorphosis from "demon" to "angel" results from changes in both the student's and the teacher's behavior. The student behaves appropriately to gain attention previously received for naughty behaviors. The teacher often finds that the child already has many positive attributes which were overshadowed by "naughty" behaviors.

Be consistent. A child who has learned from past experience that sometimes Mommy says "yes" if badgered long enough for an ice cream cone

will probably continue to beg and whine long after the first "no." If, however, a "no" response is final, then begging and whining are likely to be minimal. The same phenomenon occurs with regularity in classrooms. Consistency is the key to any successful behavior management system.

Effective teachers and children to be more consistent in their behavior. They establish limits for behavior so that persons do not infringe upon the right of others to learn. They also provide guidelines so teachers can manage misbehavior fairly and equitably. Rules can be established by teachers or children. Some recommendations for successfully setting rules have been suggested by Madsen, Becker and Thomas (1968).

- (a) Make the rules short and to the point so they can be easily memorized.
- (b) Five or six rules are adequate...children will not remember long lists of rules.
- (c) Where possible, phrase rules in a positive not a negative manner. (For example, "Sit quietly while working," rather than "Don't talk to your neighbors.")
- (d) Review the rules with the class (often)...let the children recite the rules as you ask them, rather than always enumerating them yourself.
- (e) Remind the class of the rules at times other than when someone has misbehaved. (p. 145)

While rule setting helps both teachers and children to remember the limits of acceptable behavior and act accordingly. Madsen et al. (1968) found that rules are most effective when combined with praise for compliance and systematic contingencies for misbehavior.

Consistency means that teachers decide in advance what will happen if a child misbehaves and apply those contingencies in a systematic fashion in spite of begging, cajoling, whining, pleading, temper tantrums, and so on. Consistency does not, however, imply rigidity. There are times when rules are meant to be broken and there are exceptions to every rule. For example, if a child becomes ill he should leave the room even without the teacher's permission. Opportunities for discussion and negotiation allow teachers and students to modify and appeal rules that seem unfair. The problem is to devise a fair and equitable system in which behaviors are consequences but alternatives are available in which children can appeal decisions through rational rather than irrational methods. When rules are democratically determined and impartially consequences, and when children are praised for following rules, classroom misbehavior is minimized.

Ignore. While positive interactions increase the likelihood that children will act appropriately, teachers should also be cognizant of

methods for dealing with misbehavior. Behaviors which are harmful to the child, other persons, or property require immediate intervention, and most teachers have a standard repertoire of procedures to deal with these situations. Other common misbehaviors, such as talk-outs, out of seats, and refusals to work do not require severe measures. They can be handled effectively through a combination of ignoring misbehaviors and praising incompatible or desired behaviors.

Consistency is essential when a teacher chooses to ignore a behavior. A child who finally gets a reaction from the teacher after whining for five minutes has not learned that whining does not "pay off," but, rather, that whining longer and harder gets results. The teacher will have taught the child to be a longer, harder whiner. It is especially hard to ignore a behavior for the first few days. The behavior has always gotten predictable results in the past, so the child will rise to new heights to gain the same results. If the teacher's attention has been the reinforcing agent for that behavior, and if the teacher is successful at ignoring the behavior, the child will stop using that behavior.

Use fair-pairs. It is not ethical for teachers to pinpoint only behaviors to eliminate. Emphasizing "bad" behaviors can inhibit the pupil. The child can become a "non-behaver." He/she is quiet, calm and docile, but does not have a repertoire of appropriate behaviors. The elimination of naughty behaviors, by ignoring them or by imposing other contingencies (staying after school, missing recess or a special treat), will be more effective if the teacher is reinforcing a "fair-pair."

A "fair-pair" means that a desirable behavior is selected to be paired with each inappropriate behavior. If a child's problem is "talk-outs," then the fair-pair for that behavior would be "hand-raises." If a child's problem behavior is "grabbing toys," then a fair-pair behavior might be "sharing toys." Children who often fight may benefit from learning how to negotiate and use alternative methods for settling disputes.

Sometimes children misbehave because they have not learned appropriate ways to act. Bennett and Baird (1975) discussed a case illustrating the power of teaching appropriate behaviors. Their classroom contained children with learning deficits who had been labelled emotionally disturbed. The room was organized to provide a stimulating environment which combined learning games and toys with standard academic instructions and activities. Children earned free time to play with these toys as reinforcement for good academic work. In the first few weeks children often earned freetime, but instead of playing with the toys, they destroyed them. Rarely was a toy used appropriately. Bennett and Baird decided that perhaps the children simply did not know how to play. They removed all the remaining intact games and toys. Each morning they reintroduced one toy or game and spent ten minutes demonstrating how the toy should be used, or how the game could be played. The toy or game was then placed in the free-time area and was available during that day. It remained in the classroom as long as the children played appropriately. If the toy was misused, it was removed and reintroduced at a later time. These teachers reported that both

appropriate use of toys and cooperative play increased dramatically while misuse became a rare occurrence. Freetime became more enjoyable for both pupils and teachers.

Considering behaviors in terms of fair-pairs helps teachers develop positive attitudes toward behavior management. Rather than concentrating on what is going awry in the classroom, teachers can spend time planning programs which help children to learn and to use acceptable methods of interacting with others.

Models. Sometimes problem children have not learned which behaviors will gain praise from the teachers. Instead, they have large repertoires of inappropriate behaviors which they use to gain attention, such as hitting, spitting, or talking out. Peer models can help these children learn more acceptable methods for gaining attention and managing their own behavior.

Models can be used in a number of ways. If a teacher praises a working child, while ignoring a child who is misbehaving, she/he demonstrates which behaviors gain attention and also reinforces good work habits. (Brodin, Bruce, Mitchell, Carter & Hall, 1970). This procedure has two primary benefits. First, children receive cues for acceptable classroom behavior and can directly observe and imitate the behavior of a model -- the recipient of a positive comment. Second, children who are behaving well and working quietly are praised rather than ignored, thus reinforcing their desirable behaviors.

Csapo (1972) suggests that each misbehaving child be assigned a child to imitate. The misbehaver is encouraged to observe and imitate the model's behavior whenever he/she is unsure of how to act in any situation. Naturally the model child will be one who has demonstrated effective self-management behaviors. The choice of models could rotate frequently. Every member of the class, including previous misbehavers, should have the opportunity to be a model.

A more subtle use of models would be to enlist the aid of peers to respond positively to appropriate behaviors and to ignore inappropriate behaviors. Solomon & Wahler (1973) used this method to reduce disruptive behaviors and improve the work habits of five intermediate aged boys. In this study, "peer therapists" ignored misbehaviors and praised the boys' good work habits. Apparently, for these young men, peer approval and attention were highly reinforcing.

Keep moving. A teacher who spends large amounts of time correcting papers and working at his/her desk will see neither good workers nor miscreants. On the other hand, if the teacher spends a good portion of the time walking around the classroom and is available to answer questions and praise correct responses and good work, pupils will have more opportunity to gain teacher attention in appropriate ways.

Summary. Maintaining a positive emphasis, being consistent, ignoring some misbehaviors, providing fair-pairs, using models, and roaming around classrooms are effective for individual and group behavior management. This combination of techniques certainly does not exhaust the

possible teacher management strategies. But we hope these suggestions will increase teachers' awareness of the part they play in fostering an atmosphere which reinforces good work habits rather than one that is reminiscent of a detention center. However, modifying one's own behavior is merely a preliminary activity. The ultimate goal is that children learn to be responsible for the management of their own behavior.

Developing Self-Management Skills

"Each man should examine his own conduct for himself; then he can measure his achievement by comparing himself with himself and not with anyone else... (Galatians 6:4)

The goal of any behavior management system is to help children to manage their own behavior in socially acceptable ways. Mature individuals can process information, make decisions, and take action, and then evaluate their behavior. Unfortunately, these skills are rarely taught in schools. Children are expected to acquire self-management behaviors independently. When children learn the necessity for regulating their behavior in an acceptable manner, and experience the rewards for doing this, they are well on their way toward becoming responsible persons.

Self-counting, charting, and delivery of rewards. If a child is encouraged to help count the number of occurrences of a specific behavior, a desired change in that behavior will often occur. This phenomenon was illustrated by Christensen (1975). Molly, a 12-year-old with low academic skills and many inappropriate behaviors, had a habit of putting her hand or hands in her pants. To decrease and, perhaps, eliminate this behavior, she was asked to mark a tally sheet every time she placed her hand in her pants. If Molly engaged in this activity but failed to count the behavior, she was cued by a teacher to mark her sheet. Self-marking produced immediate results. Molly seldom placed her hand in her pants and continued to refrain from this behavior when self-counting was discontinued (See Figure 1).

Insert Figure 1 about here

A similar self-marking procedure was used successfully by Jones, Fox and Billingsley (1972) to reduce the number of talk-outs emitted by a 14-year-old. A tally sheet was attached to Dan's desk, and every time he talked-out he was asked to mark a number.

Self-charting serves a function similar to that of self-counting. Charting provides the child a visual record of changes in his/her behavior. In addition, it allows a child to compare present changes in behavior to his/her own previous performance.

Children with a history of behavioral difficulties often hear many derogatory remarks such as "Why can't you sit still like your brother?" "Why are you always fighting? John never does," or "You're the worst kid in this classroom!" These statements compare one child's behavior to that of his/her peers. Unfortunately, even when the child begins to improve, he/she is still not as "good" as others. Self-charting allows the child (and the teacher) to see and enjoy even small progress.

Self-counting and charting can focus on appropriate behaviors, thereby helping children recognize appropriate ways to behave. For example, John might be encouraged to count and chart the number of times he raises his hand rather than his talk-outs.

Behavioral self-management can also be taught by allowing children to help choose classroom rules. Rules can be developed through guided discussion, and contingencies can be established which seem fair to teachers and pupils. Joint rule setting serves two purposes. First, children gain practice in learning the process of decision making and the importance of rules. Second, they are more likely to remember and follow rules they helped to select.

Finally, children can successfully choose and deliver their own reinforcers (Bolstad & Johnston, 1972; Glynn & Thomas, 1974). When provided with a "menu" of possible reinforcers such as games or activities, the pupil can choose what he/she would like to earn each day. This allows freedom of choice and saves the teacher from guessing what is reinforcing for each student.

Cognitive modeling. Children may be disruptive merely because they do not consider the consequences of a behavior. These children are often called "impulsive." A tactic which has been successful in helping these "impulsive" children is called "cognitive modeling" or "verbal mediation" (MacPherson, Candee & Mohman, 1974). Verbal mediation is a process whereby the child is required to state the consequences of his/her behavior whenever he/she misbehaves. This procedure is illustrated by a case study.

Thirteen-year-old Todd had been enrolled in adjustment classes since first grade due to his verbal and physical disruptiveness, lack of attention, and inability to stay on task. Most of Todd's time was spent making irrelevant and inappropriate comments while at his desk or as he wandered around the room. Todd's teacher (Lawrence, 1975) collected baseline data and found that he was talking-out more than twice a minute (See Figure 2). During the intervention phase, the entire class began to record their talk-outs for a thirty-minute period each day. They were required to write the following mediating paragraph each time they talked-out:

I will not talk-out in class because it interrupts my work. Also, it bothers other people in the room. If I'm quiet during work time, I'll get my assignments done. Others will finish also. Finally, the day will go better because nobody is getting mad at me for talking all the time. (Lawrence, 1975).

Insert Figure 2 about here

As Figure 2 illustrates, Todd's rate of talk-outs dropped drastically. In fact, he had zero talk-outs on some days. Lawrence also reported a simultaneous improvement in Todd's math performance. These data support the notion that mediation can reduce the occurrence of disruptive behaviors.

This type of paragraph differs from the traditional "I will not talk in class," written 100 times as punishment, because it clearly states the consequences of talking-out. MacPherson, Candee, and Hohman (1974) demonstrated in their study of disruptive lunchroom behaviors that writing paragraphs which clearly stated the consequences of behavior was far more effective in reducing children's writing paragraphs on an unrelated subject.

Children as reinforcers. Perhaps another skill we can teach children is how to become reinforcing to others. A person who is reinforcing to others is more likely to be sought out and reinforced in turn. Children can learn to praise their teachers for clear instructions; smile when they roam the classroom; and thank a teacher who has given immediate feedback or help. A child with these social skills can manage his/her own environment and change the teacher's behavior so that the teacher is in turn a more reinforcing person.

Behavior Games

The special class teacher who is plagued by high levels of disruptive, inappropriate behaviors, and has not been successful in using any of the previous techniques, might find relief in the form of a group behavior management system. Billingsley and Smelser (1974) used such an approach in a classroom at the Experimental Education Unit. This behavior game was similar to a group management system reported by Sloggett (1971) but was not as complex and required less bookkeeping or teacher time.

The class of 14 elementary-aged children, labeled as emotionally disturbed, educably mentally retarded, and learning and language disabled, was divided into two teams. Both teams participated in the setting of classroom rules. The rules were conspicuously posted in the classroom and levels of acceptable behavior were determined. A simple tally on the blackboard was used to record each rule violation. No other statements were made. If either team surpassed the number of allowable rule violations, the members lost the opportunity to participate in gym and crafts classes at the end of the day. This behavior game was successful in reducing the number of undesirable behaviors to the limit which the teacher felt was acceptable for children of that age and ability.

The Good Behavior Game has been analyzed by Harris and Sherman (1973). The critical components of this method appear to be: a) providing reinforcement contingent upon acceptable levels of behavior, b) using teams rather than the entire class, and c) setting a criterion number of marks needed to win or receive reinforcement (the level of disruptions tends to correlate directly with the established limit of marks).

Other successful methods of using group reinforcement have been reported in the literature. For example, Long and Williams (1973) found that group contingent free time for appropriate task-related behaviors maintained slightly higher levels of acceptable behavior and greater day-to-day stability between and within students, and made fewer demands on the teacher, than did individual programs. Wilson and Hopkins (1973) reported that group contingent music was effective in reducing the noise level in a classroom. If the total noise exceeded a threshold level, the radio was switched off for a period of time or until the class became quiet.

Token reward systems are possibly the best known behavior modification techniques for managing disruptive behaviors. A token system provides for the systematic distribution of prizes or rewards on a frequent basis. It has three characteristics. First, a set of instructions stating which behaviors will be reinforced is given to the class. Second, tokens are awarded contingently when children perform the required behaviors. Third, a set of rules is established governing exchanges of tokens for back-up reinforcers. Back-up reinforcers may include food, toys, or activities.

Considerable evidence indicates that token economies are effective in: decreasing disruptive behavior, increasing study behavior and increasing academic achievement (O'Leary & Drabman, 1971). However, recent articles evaluating token economies caution against their wholesale acceptance and potential misuse (O'Leary & Drabman, 1971; Kazdin, 1972; Wnnett & Winkler, 1972). These concerns combined with the complexity of managing a token economy have led teachers and researchers to search for alternate methods of achieving behavior change.

Summary

Various behavior management strategies designed to help teachers create an environment conducive to learning have been suggested. Ample research evidence supports the utility of these techniques. Teachers who become proficient in applying these methods are rewarded by maintaining an atmosphere of purposeful learning with minimum amounts of classroom disruption. When setting up any behavior management system, teachers should keep in mind six points.

First, keep it simple. The system has to be something the teacher can manage without complicated bookkeeping or data collection. It has to be a system children can understand. There is no intrinsic value in a complicated, highly structured system for behavior management.

Second, keep it natural. Children will eventually have to learn to live in a world that may not be highly structured or systematic in the delivery of reinforcement or punishment. Natural consequences for behavior reduce the necessity of complicated generalization and re-education procedures.

If highly structured systems and extrinsic reinforcers (food, candy, prizes) are necessary to initially produce desirable behaviors, teachers need to change to more simple and natural procedures as soon as possible.

Third, use self-management. Teaching children how to manage their own behaviors is the true goal of our educational system. The curriculum may soon become outdated; therefore, children need to learn social and academic management skills that help them survive in a rapidly changing world.

Fourth, choose "fair-pairs." Any behavior management system will be more successful if children are reinforced for good behaviors as well as punished, ignored, or consequted for inappropriate behaviors. It is not ethical to take away a child's maladaptive behavior without also teaching appropriate behaviors.

Fifth, don't be afraid to individualize programs. It is not necessary to behave the same way toward all children. Some pupils might need a highly structured behavior management system, while others in the same classroom might benefit from self-management techniques.

Sixth, and finally, take data. Data collection helps teachers and students to judge accurately the benefits of any behavior management system. It helps in determining whether a program is actually working. It also allows the teachers to judge whether a behavior is sufficiently disruptive to warrant intervention.

Academic Organization and Planning

Individualized programs require extensive organization and planning because each student must receive the right work in the proper amount and at the correct time. Programs are continually changing because each student works at his/her own pace in materials of various levels. The teacher's role in an individualized classroom is to coordinate materials, implement teaching strategies, and continuously evaluate progress to aid children's learning. These tasks need not be insurmountable, although they are time-consuming.

General preparations necessary for smoothly operating a classroom occur before students enter for the year. Consideration should be given to three areas: 1) long-term master planning, 2) pre-planning for data collection and record-keeping and 3) location of personnel and resources. Other activities such as daily schedules, collation of material, and program changes take place regularly during the school year.

Master Plan

General pre-planning includes locating materials for assessment, placement, and instruction; setting and evaluating overall goals; and constructing a master schedule. Curriculum guides may provide some of this information. Specific suggestions for assessment and placement are included in the chapters on reading, writing and arithmetic. Science, social studies, art and music may be coordinated by others, or by the teacher if the planning is for a self-contained classroom.

Overall goals for students may be established and evaluated to predict whether the goals may be reasonably attained. For example, in the curriculum research classroom, one goal was to have children reading at grade level by the end of the year. We knew that the students, aged 9 to 11, would probably be reading one to three years below grade level when they entered. We had decided to assign 500 words per day from their instructional reader. By using these two pieces of information (and the number of school days available) we were able to predict how much material could be covered if students read every page in their readers. The result was extremely disheartening. It became apparent that the students could not possibly reach the goal of reading at grade level if this plan were followed. This revelation led to the development of the reading skip program discussed in Chapter 3, Reading.

Predictions of projected gains are also useful in other areas. For example, if a prospective student cannot add basic facts, it would be unreasonable to set a goal that he or she master three-place addition with carrying within a month. If goals are unattainable, a teacher has two alternatives: 1) modify the goals or 2) change the program.

A general sequence of objectives within each academic subject will aid in planning teaching strategies. These objectives may consist of simple listings of processes. For example, objectives in arithmetic may include: basic addition facts, two-column addition without zeros or carrying, three-column addition without zeros or carrying, etc. Or they could be in the form of sequenced behavioral objectives. These activities enable teachers to sequence tasks for instruction, to divide broad tasks into subskills, and to develop a suggested timeline for task completion. Some children require instruction on each subtask while others are able to move quickly through the sequence by generalizing and transferring knowledge.

Time scheduling is crucial to managing individualized programs. Teachers must arrange time for students' activities and organize their own schedules to provide individual assistance and cues for students. It might be convenient for the entire class to work on arithmetic at the same time. However, arithmetic can be practiced and taught with a minimum of teacher time while other subjects such as reading may require one-to-one instruction. Therefore, subjects such as arithmetic, spelling, and handwriting should be kept "teacher-free" when possible to leave the teacher time for individual work in reading or other deficit areas. A teacher-free activity is one which is organized and presented in a manner that permits students to teach themselves or each other, to complete their assignments independently, and to correct and evaluate their own work.

Prior information about prospective students will help the teacher select an area in which each student will need individual help, and will help the teacher plan time for extra instruction. This critical area may differ for each child. Some need language and communication experience, others need help in reading or math. If this information is unavailable, exact time schedules will need to be rearranged later.

Even within totally individualized classrooms, time should be set aside for group activities. Some subjects such as social studies and art are amenable to group instruction. Group activities do have important uses in the classroom which cannot be satisfied if children always work alone or with a teacher. During group activities children learn and practice participation skills such as waiting their turn, listening to others, and contributing to group discussions. Group activities build cooperation and develop communication abilities among students. Finally, group activities provide opportunities for students to take turns teaching each other. They learn how to present activities and lead discussions. An education should socialize and civilize children as well as instruct them in basic academic subjects.

Data Collection

Decisions on the amount of data to be obtained from each student and on methods of data collection are made during the pre-planning period. In general, data from initial assessment and placement activities are analyzed to diagnose each student's strengths and weaknesses and to plan remediation programs. Data on each target behavior should be collected and used daily to determine whether students are progressing satisfactorily or whether programs should be changed.

Teachers accumulate substantial amounts of data on children's performance. Each workbook assignment, spelling list, or short story completed by a student could be recorded and analyzed. The purpose of precise data collection is to harness these valuable sources of information to facilitate decision making. Many teachers, however, have not learned how to use data. Instead, for these teachers, data collection becomes a time-consuming and complicated procedure. The materials they use often defy useful data collection, tasks they assign change, and the amount of work they assign fluctuates continuously. As a result the data seem meaningless. With careful planning, data can be used meaningfully to continuously monitor students' performance.

Consistency is necessary for obtaining useful data. The tasks required of the student should be consistent day to day. This consistency need not imply sameness or dull regularity. Daily tasks are equivalent when they require similar responses and are of the same level of difficulty. For example, if the goal is to improve a student's accuracy in oral reading, then measures of this skill should be obtained daily in similar materials until some criterion performance is achieved.

Assignment sizes should also remain equivalent each day. Performance is influenced not only by the skill being measured but also by the

size of assignment and length of time it is measured. In general, students perform at their highest level in short bursts. If students complete 10 math problems on one day and 30 on another, their performance may be influenced by the size of the assignment rather than reflecting their actual ability to compute math problems.

Finally, the teacher must be consistent in carrying out teaching strategies. Teachers who require students to learn in different manners each day are not likely to determine which interventions are most effective for their students. This kind of consistency seems to be most important when the child is acquiring new skills (McGulgan, 1974). Children with learning problems often have difficulty focusing on the skill to be learned. They become confused and distracted by novel instructions. Once a skill has been acquired and the child is becoming proficient, then some novelty might help him/her generalize the learned skill.

Small amounts of data are much easier to use efficiently than are extensive data. Teachers who are beginning to collect data often take far more than is necessary. When this happens, data collection becomes time-consuming rather than time-saving. We need to emphasize that samples of performance may be used to evaluate progress. For example, one- or two-minute samples of a student's performance in oral reading or math facts are often sufficient to monitor the progress made during a thirty-minute period of instruction, drill, and practice.

Behavior samples may be obtained individually or in groups. For example, even though students are working on different kinds of facts or problems, a one-minute sample of all the children's performance could be taken simultaneously. The teacher merely tells the students to begin working on their worksheets and asks them to stop when one minute has elapsed. The data are taken on all children at once, but reveal information particular to each child. This method of data collection is useful when written responses are required. However, some skills, such as language or oral reading, are not amenable to group data collection and should be recorded individually.

Data are usually collected in one of two ways: by time or amount. Time or rate data are more precise than are amount or percent data. Rate data provide a measure of both accuracy and fluency, whereas percent data only attend to accuracy (Lovitt, 1970). To obtain a rate measure it is necessary to determine both the time taken to complete a task and the number of movement cycles performed (refer to Chapter 6). Rate is then calculated by dividing the number of movement cycles by the time of the sample. Rate data collection and calculation are simplified if the time period is held constant. One-, two- or five-minute samples of behavior can be easily collected. Clocks with second hand sweeps, stopwatches, timers, or pre-recorded taped signals of specified intervals may be used to indicate the end of the specified time period. The amount of work completed may then be determined by using counters, check marks, or pre-counted materials.

Data summary and recording sheets provide a permanent record of each student's progress. When the information on these sheets is

transferred to graphs, a visual picture of a student's progress is obtained. These recording sheets and charts may be kept by the teacher or student. Examples of a data summary sheet and a graph for a pupil, Mike, are shown in figures 3 and 4.

Each day, Mike wrote answers to multiplication facts for two minutes. He corrected his work against a master sheet and recorded the total correct and error problems completed on his data sheet. Mike then divided these figures by two to obtain a correct and error rate per minute and plotted these scores on his chart. This activity took about two minutes to complete each day. Mike and his six classmates were able to record and maintain charts daily for between five and ten different subjects.

Insert Figures 3 and 4 about here

Data do not need to be obtained in every subject or every day. Daily data collection on target behaviors in reading, math, writing, and spelling is necessary to monitor progress and make program decisions. Other data may be kept less frequently. Occasional samples of proficient behaviors or terminal goal behaviors are sufficient. For example, if a student can decode words proficiently but needs to develop critical reading skills, then frequent measures should be obtained on the latter to evaluate progress, but infrequent measures should be taken on the former to ensure that the student is maintaining proficiency. Progress toward stated goals in social studies, art, or music may be evaluated periodically rather than on a daily basis.

When a teacher is beginning to collect and use data, daily measures should be obtained initially on a few students or in a few subjects until the collection systems are operating smoothly and the teacher is comfortable with the process. If too much data collection is attempted, the teacher can become over-burdened with information he/she does not know how to use.

Personnel and Resources

Individualization is easier to accomplish when extra personnel are available. Classroom helpers are expected to help, not replace, teachers. Therefore, helpers should collect and correct papers, manage group activities, monitor recess, etc. These services free the teacher to tutor and give extra help to students.

Sources of help for the classroom are numerous. Paid or volunteer aides are traditionally used to handle administrative chores. Student teachers are often available to assist; however, they remain for only a short period and require experience in all aspects of running a classroom. Parents, friends, aunts, retired persons, and other volunteers may be enlisted. Many of these persons have special skills which can be drawn upon in the classroom.

A major source of added assistance is provided by students themselves. Peer tutors of the same or different ages may be enlisted and trained to handle administrative chores and monitor students' practice sessions. "Chain teaching" can save energy and time; the teacher shows one student how to perform a skill and he/she in turn trains a second, and so on. Students in the class can take turns as assistant teacher or "buffer" to answer questions and manage class decorum.

Personnel recruitment should begin as soon as possible. The first few days of school may be too confused and demanding to attempt to locate personnel. Therefore, arrangements should be made before school begins. Whenever possible helpers should be given meaningful jobs in addition to completing regular classroom tasks. If helpers are given guidance and specific instructions they will know what is to be expected of them. At first extra personnel may cause headaches, especially if their duties are unclear or they need extensive training. The effort will be beneficial, however, because helpers can become invaluable extra arms, eyes and brains.

Occasionally helpers may become hindrances. If personalities clash or work is poorly completed, students will ultimately suffer. In order to avoid traumatic scenes it is often beneficial to establish a standard probationary period for helpers so either party can end the relationship gracefully.

An inventory check and the acquisition of machinery is the final pre-planning task. Tape recorders, film strip machines, and language masters can be as effective as a second teacher. Tapes and language master cards can be used to administer spelling words, directions for exercises, stories for children to listen to, and many other activities. Any task which can be pre-recorded will reduce the demands on the teacher.

Daily Tasks

A few minutes set aside in the morning to get prepared for the day help reduce confusion later on. Many teachers use a daily schedule to note each student's assignments. One example of a daily schedule is shown in figure 5. Each student's name is arranged vertically while subject areas are listed horizontally. Assignments are coded according to the teacher's shorthand. One notation indicates the materials to be used, a second notation is used for teaching strategies or correction contingencies, while a third notation may indicate the reinforcement schedule. For example:

Students were assigned between three and five activities in arithmetic each day. These activities were in three areas: basic facts, process skills, and story problems. Vance was required to complete a one-minute timing of basic addition facts to help build fluency. He also wrote answers to a sheet of difficult division facts. All students were building fluency in addition facts but some students were also provided with a model or flash card drills. The other subjects were

similarly individualized. By referring to this daily schedule, the teacher was able to assign work, determine the amount and variety of instruction and/or correction contingencies to use with each student, and check off completed assignments. Special notes about students, such as added assignments or special activities, may also be written on this sheet.

Insert Figure 5 about here

Once the daily schedule is completed, the students' work folders are filled. All the assignments for each child for that day are collated and placed in a folder for easy access for both teacher and student. In the beginning of the year, each assignment may have to be passed out and collected by the teacher. Later, students can learn to schedule their own time and determine which assignment should be completed next. If possible, students should be allowed to complete their work in any order they wish. Special marks may be written on top of pages to alert students to new tasks which should not be attempted until they have consulted with the teacher. Other notes may tell students how to time a page or how much work to complete. Self-teaching tips may also be included at the top of each page.

Pre-made correction sheets simplify correction, enable students to verify their own work, and facilitate feedback. Correction sheets are most useful in math and spelling, especially when teacher made materials are used.

Check-off sheets can help the teacher and student determine which tasks have been completed and which are left. One type of check-off sheet, the daily schedule, was discussed previously. Other check-off sheets can be devised for the child and teacher. These may be in the form of student contracts. A list of each subject area is taped on the student's desk and he/she checks off each assignment as it is finished. The student check-off sheet helps the student to manage himself/herself. Another kind of check-off sheet can be devised for data collection, recording, and charting. If students are keeping their own charts, check-off sheets serve as reminders of the steps necessary to manage their own data.

Teachers who rely on self made material and worksheets rather than published textbooks need a system to keep track of the materials each student is currently using in order to efficiently locate more pages or sheets. Color coding is one method for dealing with this task. Each student is assigned a different color and strips of construction paper are used to mark his/her place in readers, in math sheet files, and spelling word files. Collecting pages is simplified by attending to colors in a file rather than cross referencing by name. Students can also learn to use this system to locate their own materials.

Student Power

Individualization is less time-consuming if students are involved in managing their own program. As stated previously, students can schedule their own programs and learn to use check-off sheets. Lovitt (1973) found that students could manage their own work schedules with little difficulty. When students were allowed to sequence the order in which they completed their work their performance also improved.

Students can correct their own work and each other's. Self correction not only conserves teacher time, it may also result in improved learning. Hansen and Lovitt (1974) found that self correction in spelling enabled students to learn unknown words faster and remember them more accurately than did teacher-correction. Honesty is a concern when students are allowed to self-correct their work. A few safeguards in arranging self correction opportunities will remove the temptation to change answers. Students should correct their work in a special supervised area. They should use different colored pens for correcting their work. Finally, accuracy is ensured through random checks of student's corrections and giving reinforcement for careful and accurate corrections.

Many classroom chores can be relegated to students. As noted previously, they can locate their own materials for work folders, file their work as it is completed, and make their own flash cards or language master cards. Students can also be responsible for implementing their own relearning procedures. For example, a math program called "Build your Skills" was developed to ensure maintenance of learned processes and as a re-learning tool (Ashworth, 1975). Each day students completed four kinds of addition and subtraction problems chosen at random from a pool of problems which were already learned. The students worked the problems and checked their answers against a correction sheet. If a problem was incorrectly answered, the student referred to a file box with written directions and examples of how to compute each problem type. They read the directions and corrected their error. Students then located a sheet of practice problems of the same type from a third file and practiced and corrected that sheet of math problems. Thus students learned how to correct their errors, review the appropriate computation procedure, and practice working the problem.

Students can become personally involved in their own learning and progress by collecting, charting, and evaluating their own academic data. As they gain proficiency in analyzing data they can learn to contact the teacher when they need to make a change in their program. Students have been taught to count, record, and chart their own data as early as first and second grade. Evaluating growth and choosing learning strategies are more complex tasks. However, Hansen (1975) found that 9 to 11 year old learning disabled boys were able to choose their own methods of learning in spelling almost as effectively as the teacher did.

Finally, students can teach each other. It has often been observed that a person learns a skill better when he/she must teach it to others. Therefore, chain teaching, where students teach each other, is educational

as well as economical. Students can also tutor one another and listen to each other work. In this manner they play two parts: teacher and learner. Care must be taken, however, to ensure that each student has an opportunity to reverse roles and that teaching or tutoring is conducted in a constructive manner.

Summary

Although preplanning and organization initially entail a large amount of work and time, they will have rewards. First, they allow for more efficient teaching. Children receive materials that are challenging but not frustrating. Teachers are able to provide specific instruction at the time when it is most useful to their charges. Second, preplanning and organization reduce the workload in individualization. Materials are easily located, teaching strategies are preplanned, and sequences of learning activities are developed to ensure maximum progress with a minimum of confusion. Third, the teacher has more time to teach. Less time is required to shuffle papers when classrooms are well organized. When students know what is expected of them they will spend time learning rather than asking directions or finding paper and pencils.

Consistency is the key to appropriate classroom management and organization. Students know how much work they must complete within a specified time period when assignments are consistent from day to day. Students also acquire a set of behaviors which will help them learn new skills when teaching strategies remain consistent and in accordance with students needs.

Behavior management is not intended to produce children who are still, quiet, and docile. It merely provides limits and rules which are democratically determined and equitably dispensed. Students learn appropriate social behaviors which will help them interact effectively with others and which allow others to concentrate on their work.

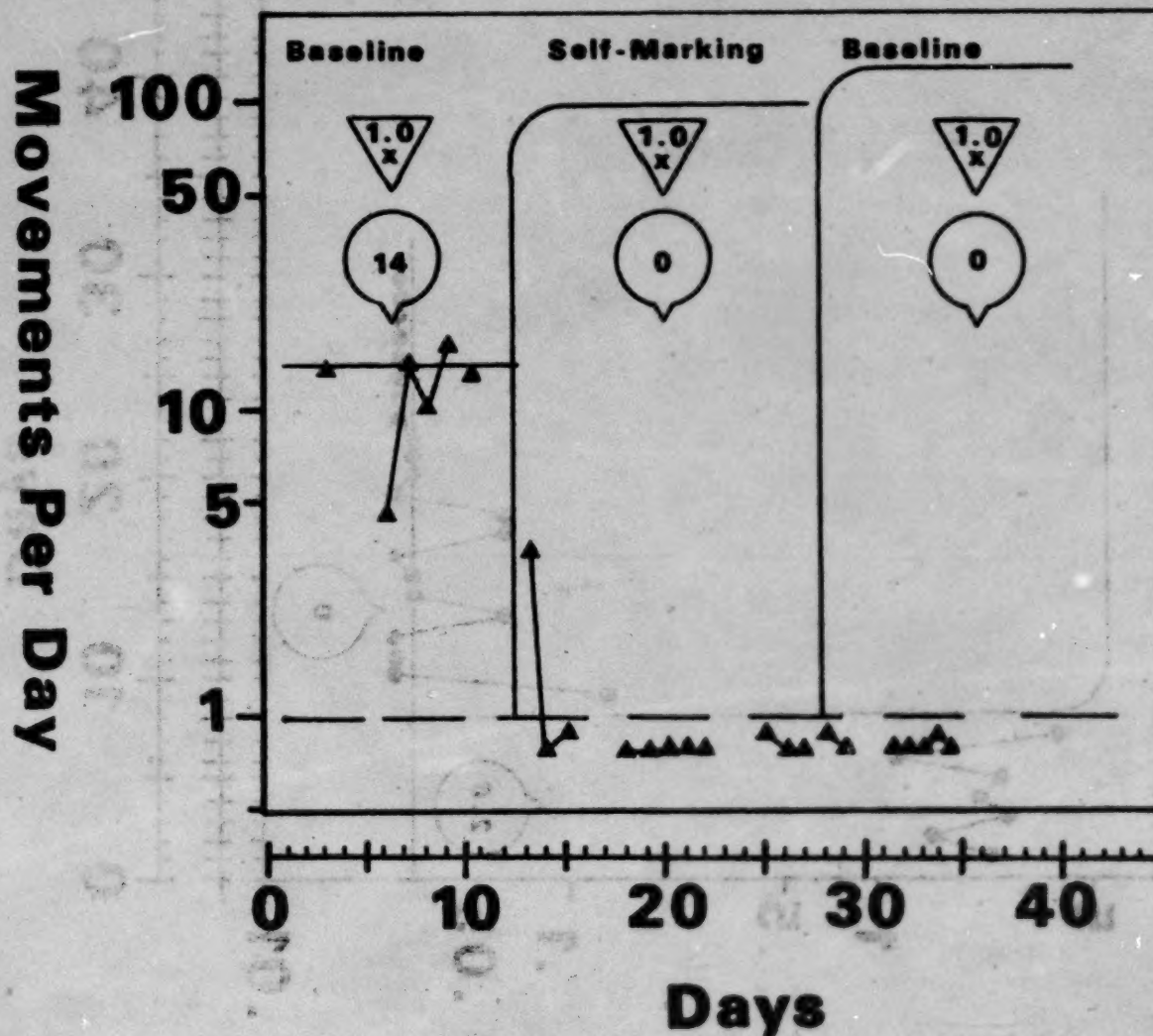
In a well run classroom, students know what rules they must follow. They learn to work without infringing on the rights of others. Fair rules permit freedom without anarchy. The teacher is not the "bad guy" where discipline is concerned. Consistently followed guidelines for behavior enable the teacher to dispense praise and punishment in an equitable manner. Actually, where good behavior management principles are followed, the teacher praises children far more than he/she punishes them.

Ways to encourage self management in students have been suggested throughout this chapter. Self management has rewards beyond the scope of just one classroom. Students who can successfully manage their own social and academic behaviors learn critical life skills. They learn to accept responsibility for their own actions and for their own learning. Students who can manage their own learning experience the thrill of

knowing they can succeed at some very difficult tasks. They can replace their image of failure with one of self-confidence. In actuality, self management is the real goal of schooling. It teaches a person "how" to learn. These skills will far outlast current curricula.

In this chapter a few suggestions have been made for classroom management and organization. Many of these ideas will be common sense or redundant for some teachers. We hope that a few new ideas will spark teachers to modify their classroom practices and improve the probability that students make maximum use of their school year.

Figure 1



CHRISTENSEN
Manager

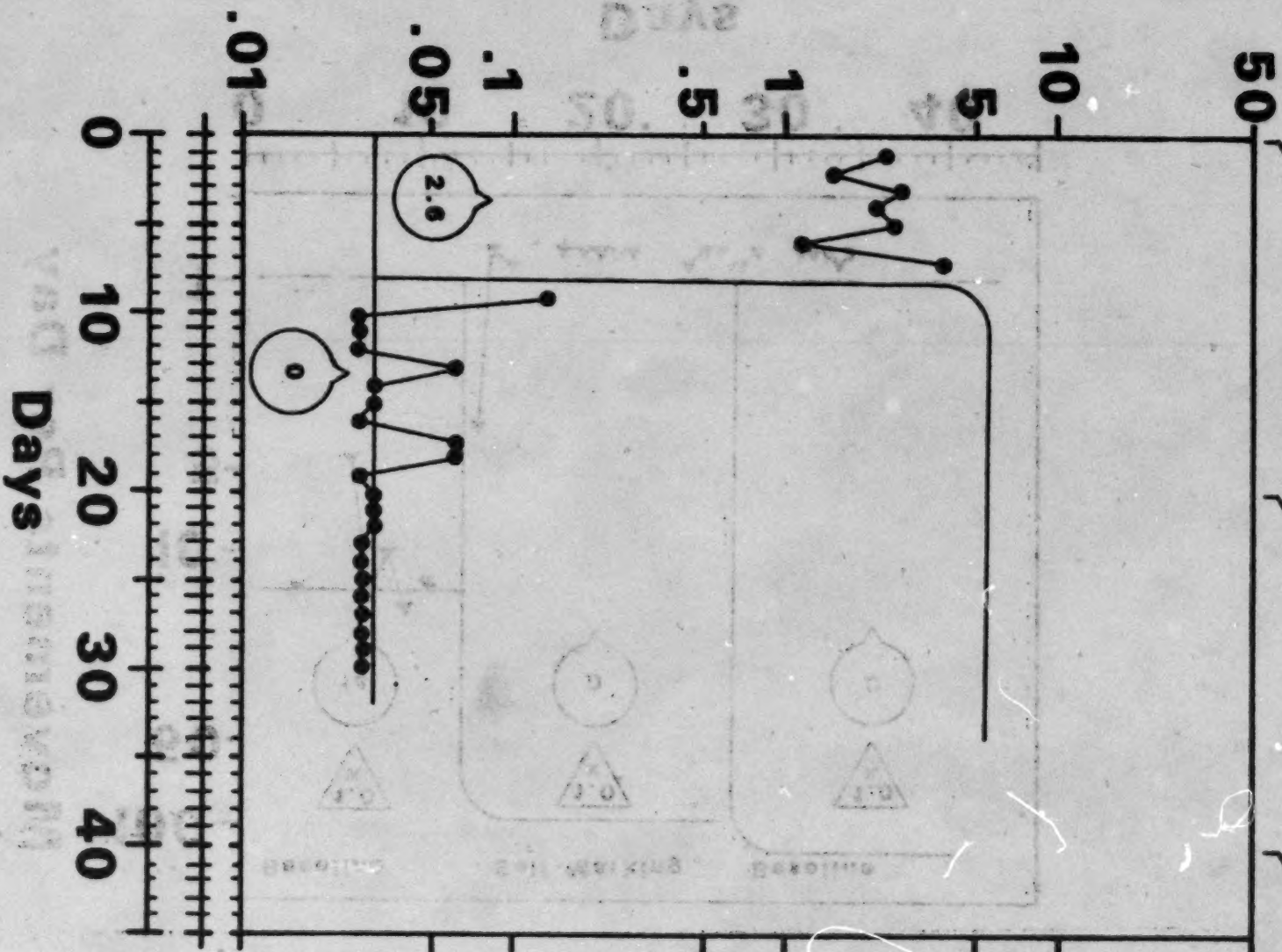
EATON
Advisor

MOLLY
Behavior

12
Age

HANDS-IN-PANTS
Movement

Movements Per Minute



LAWRENCE
Manager

EATON
Advisor

TODD
Behavior

13
Age

TALK-OUTS
Behavior

Days

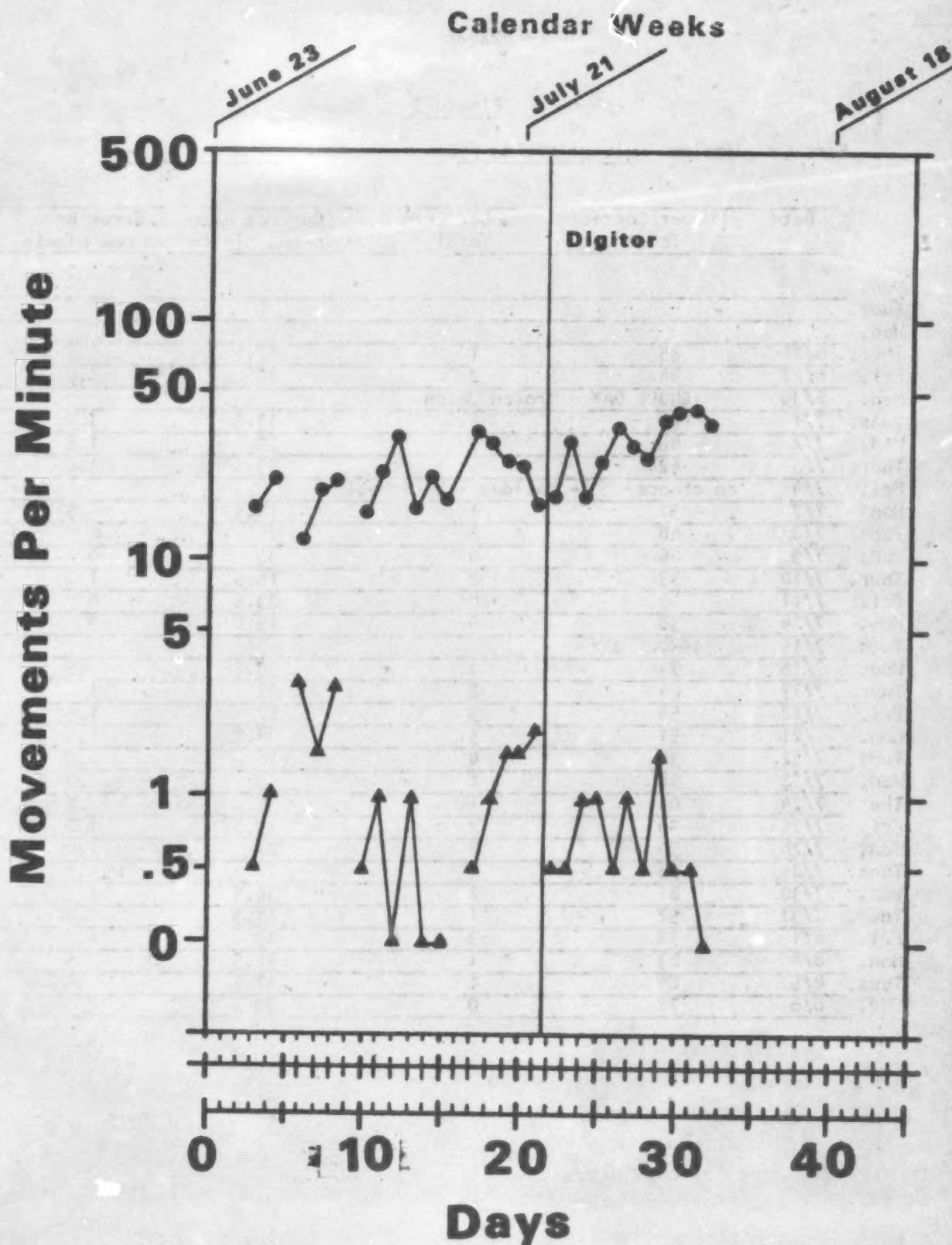
Figure 2

Figure 3

Fact Computation Multiplication Facts

Name Mike S.

	Date	Number Correct Total	Number Errors Total	Correct Rate In one minute	Error Rate In one minute	Aim
Mon.						
Tues.						
Wed.						
Thur.	6/26	35	1	17.5	.5	
Fri.	6/27	44	2	22	1.0	
Mon.	6/30	IGNORE DAY - Broken Watch				
Tues.	7/1	27	6	13.5	3.0	
Wed.	7/2	40	3	20	1.5	
Thur.	7/3	42	6	21	3.0	
Fri.	7/4	no chance	- Holiday - No School -			
Mon.	7/7	31	1	15.5	.5	
Tues.	7/8	48	2	24	1	
Wed.	7/9	66	0	33	0	
Thur.	7/10	33	2	16.5	1	
Fri.	7/11	47	0	23.5	0	
Mon.	7/14	38	0	19.0	0	
Tues.	7/15	IGNORE DAY				
Wed.	7/16	71	1	35.5	.5	
Thur.	7/17	64	2	32	1	
Fri.	7/18	54	3	27	1.5	
Mon.	7/21	51	3	25.5	1.5	
Tues.	7/22	36	4	18	2.0	
Wed.	7/23	38	1	19	.5	
Thur.	7/24	64	1	32	.5	
Fri.	7/25	39	2	19.5	1.0	
Mon.	7/28	54	2	27	1	
Tues.	7/29	76	1	38	.5	
Wed.	7/30	61	2	30.5	1	
Thur.	7/31	57	1	28.5	.5	
Fri.	8/1	78	3	39	1.5	
Mon.	8/4	83	1	41.5	.5	
Tues.	8/5	85	1	42.5	.5	
Wed.	8/6	78	0	39	0	



K. FANTASIA
Teacher

MIKE S.
Student

MULTIPLICATION FACTS
2 MINUTE TIMING
Program

Morning Schedule

Class - Room 107

Teacher - Hansen/Ashworth

Date - 1/22/75

Figure 5

NAME	MATH		STORY PROB.	READING		SPELLING	WRITING	EXTRA
	FACTS	PROCESS		INSTRUCT	LIBRARY			
Vance	1' Add Form B Div. Hard	Place Seq. Sheets		G 156-159		Rev 1 6 Oral Base	UC- (J,L,Q,U,Y)	
Chuck	1' Add Model Mult. 100 Facts	nnb - xx 2-d Instr.	n 1-b	I 188-191		5 0 SC-CCC	LC- (B,F,U,V,W)	
Hark	1' Add B Div. Hard	nn xn 1-e Instr.	T2 2-d 5-a	SRA-C 21-26 Correct Errors		Rev 4 5 Oral Base	UC- (E,D,L,T,Y)	
Dave	1- Add Flash	nbb -xx 3-b	2-d 5-A	D 79-84		Rev 5 6 400 CCC	LC- (B,F) Conn-	
Cal	1' Add A Div. Hard	nn x n 1-e Instr.		G 272-277 Pre-Read		5 0 SC-CCC	UC.	
Garth	1' Add B Div. Flash	nn xnn 1-e Instr.		I 71-73		Place 2-6	Beat Rate X 66 High 78	
Murph	1' Add B Div. Flash	XXX xXXX 3-d Instr.	100% yes 3-g 4-b	I 309-311 Silent Read		5 0 SC-10X	UC-(A)	

-222-

247

248

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CHAPTER 8

STRATEGIES FOR MANAGING NAUGHTY BEHAVIORS

Introduction

Ever since there have been schools and teachers have been engaged to teach children, those teachers have had to deal with children who misbehave. Although those behaviors which have been termed as undesirable have possibly changed over the years, there are some which have remained constant. Some of these perennial undesirable behaviors are: talking out of turn, getting out of a seat without asking permission, using naughty language, fighting with other children.

The degree to which these behaviors have been tolerated over the years has, I imagine, changed. According to my elders, the schools at the beginning of the century did not put up with much nonsense. If a child exhibited a naughty behavior, he was soundly thrashed. Furthermore, as I have been told, the student received a second beating when he returned home (that is, if his parents knew of his misadventure).

I can personally comment on the type of misbehavior that was not condoned in the 30's and on the subsequent punishment which was delivered. It is my recollection that in those days, at least in a small Kansas town, the teachers had little tolerance for children who were out of their chairs, who talked out, or who fought with other children. They pounced on the offenders and generally gave them a slap or at least a harsh reprimand. Often the offending child's parents were informed and the violator was required to stay after school.

In today's schools there appears to be greater variability in respect to what constitutes a naughty behavior and what teachers do when these behaviors are exhibited. Some teachers are piqued by the slightest infraction; they cannot tolerate the slightest talkout or even minimal roaming about the room. Other teachers are more tolerant, they allow pupils to talk to one another and wander about the classroom so long as the distraction level is low.

Some teachers become violent as a result of certain infractions. Some teachers, for example, become unglued when pupils swear in their classes. They dispense their severest punishment. Other teachers are more gentle in the way they handle behavioral infractions.

It is also apparent that teachers (today's and probably those of the past) are inconsistent in respect to both the dimensions I have discussed. The behaviors which one teacher describes as naughty change from time to time, often from one day to the next. This is also true when it comes to the reactions of teachers to certain naughty behaviors. One day a teacher will ignore a certain behavior, the next she will explode.

There are several approaches teachers have used over the years in their attempts to attenuate certain naughty behaviors. They have scolded, threatened, spanked, deprived, lamented, and cried. They have sent the child home, to the school psychologist, to the principal. They have given in, given up, and given out.

In some cases when teachers have reacted to disruptive or naughty behaviors they were successful; that is, the child no longer misbehaved, or the teacher was no longer perturbed by the behavior. In many other instances, however, teachers have failed in their attempts to deal with naughty behaviors. As a result their lives become miserable at school, they cry when they come home, their husbands become irate with their complaints, their households are generally disrupted. These teachers can barely get out of their beds in the morning to face another day. They know they have to deal with John, Rob, and Sue, those incredible, incurable monsters. Most of her thoughts and designs are focused on those three dreadful children. Daily she chalks off another day from her school calendar. All she has to live for are weekends, vacations, and the end of the school year.

Why Teachers Fail

Of course there are many reasons why teachers fail in their attempts to curtail naughty behaviors. Each attempt, because of a multitude of variable circumstances, is unique. However, I would speculate that in most of the instances where teachers failed to attenuate a naughty behavior there were at least two common traits.

The first, I have already mentioned. I would speculate that in most of those instances where teachers failed, they were inconsistent. They were probably inconsistent in two ways. More than likely they were inconsistent in their perception of what constituted a naughty behavior. For example, one day a behavior would be perceived of as naughty if a boy barely raised up in his chair. The next day, the behavior would not be judged as naughty unless the boy walked around the room. Many of these teachers are also inconsistent in regard to their reactions to the behaviors they have referred to as undesirable. One day if a child raises up in his seat he is scolded, the next day he is ignored, and the following day, sent to the office for the same behavior.

Another feature of these unsuccessful modification attempts is that they generally are not documented; no data are kept. Rarely have I been shown a graph or other record of the target behavior when I have talked with teachers about their unsuccessful attempts to modify behaviors. Ordinarily, when I have asked teachers about what they tried in their effort to attenuate certain behaviors, they have said, "I have tried everything, the child is hopeless. He should be sent to another class." Often when I have recommended other techniques, I am told that they were tried and were also ineffective.

Changing Behaviors

There are several available techniques which teachers can use in their attempts to curtail undesirable behaviors. I will describe a number of these tactics throughout this chapter. Some techniques are recommended for groups of youngsters, others for individuals. All the techniques recommended here have been researched, some rather extensively.

First Step in Controlling Behavior

Before teachers select any of these techniques, however, there are certain preliminary steps they should consider. It has been my experience that when these steps have been attended to, many of the naughty behaviors which annoy teachers disappear. Many of the behavioral problems which seemed so important do not require attention.

Change classroom. My first recommendation, before the heavy artillery are brought in to quell the irksome behaviors, is that the teacher should make the classroom as appealing as possible. Let's face it, some teachers run a pretty dumb show. They have old, out-dated notions about what is important and "relevant," they use absurd or "corny" examples to make their points, their schedules are grueling and inflexible, the rooms are drab and boring, the seating arrangement is not conducive to learning.

Although teachers cannot do everything they would like in order to alter a poor environment, they can do several things. But the point I am trying to make here is that teachers should do everything possible so their classroom is a good situation in which to live and to learn. This is extremely important when we consider that the children, and the teacher, must survive in this room for five or six hours a day for nine months.

State goals. My second recommendation for teachers before they resort to special techniques, is that they clarify their educational positions. They must present their views in regard to acceptable and unacceptable behaviors so they know what they mean, and so the children understand the situation. Sometimes teachers are not certain which behaviors they want their children to exhibit and which behaviors of children they cannot tolerate. If the teacher does not want the children to roam about the room or talk without asking permission, she should make this position clear. If she does not want her children to swear under any circumstances she should state this. If she does not want her children to tattle on one another, she should clearly state this position. She must specify all those behaviors she does not want to occur in her classroom.

Accordingly, the teacher should tell the pupils which behaviors she does want them to exhibit. If she wants pupils to begin their work promptly, to work on it continually throughout a period, to finish the

assignment before the allotted time, then ask for more work, she should describe this "rewardable" sequence of activities to the children. If she wants them to ask her for help, to progress in their school work, to take work home, to say nice things about their peers, this information should also be passed on to the children.

After the teacher has listed as precisely as possible all the behaviors she does not want to occur and those she does want to happen, she should reflect on those choices. She should ask herself about the wisdom of her choices. She should question herself as to whether it is truly important that her children do or not do some of the behaviors she has listed. She must consider whether she is simply trying to force them into an ancient and perhaps non-negotiable mold, or whether she is "doing what is best" for her charges.

After she has reflected on all these items she should then revise her "do's" and "don'ts." It is this revised list that should certainly be explained to the class. (I should also point out that I believe teachers should periodically evaluate these lists.)

Change teacher behavior. I believe teachers, once they have presented this list to their children, should consider a third strategy before they bring in sophisticated techniques to alter irksome behaviors. Teachers should alter their behaviors according to the items on their lists. They should praise, or in some other natural way reinforce pupils for doing what she believed they should do, and ignore, or in some other way extinguish those behaviors she believes should not occur.

Most teachers, in fact most people in general, do not naturally behave this way. Commonly, if a pupil does something that is on the approved list teachers do or say nothing. They believe, apparently, the pupil should do this and since he should, they need not give him anything. Then, when pupils do something that is on the "no" list teachers attend to this in the form of reprimands, treats, insults. For some pupils this is the only attention they receive. For some of them, since attention is a necessary ingredient of life, bad attention is better than no attention, so they continue misbehaving.

Establish rules. The fourth strategy for teachers who wish to squelch naughty behaviors, and a strategy which should be employed before more drastic, hence expensive, approaches are used, is to establish a few rules. Furthermore, there should be some consequences attached to those rules (many of which could be formed by the children, or the children in consultation with the teacher). There should, however, be only a few such rules. Teachers should declare rules in respect to the most important or troublesome aspects of the classroom. If the teacher believes that the most important behavior in her class is that the children should complete all their assignments, she should make a rule with a contingency in reference to this. She could specify if a pupil does not finish all his work by 3:30, he must take the unfinished tasks home and complete them there. She could also state that the pupil will not be allowed to come to school the next day unless he brings the completed homework. (If such a contingency is established the teacher must be certain that school is a fairly reinforcing place.) Similar

rules with consequences could be arranged for other behaviors that should or should not occur.

Although teachers (parents for that matter) have always proclaimed rules for children, they have not always altered their behaviors. There are, I believe, at least two reasons which could account for this failure. For one thing, some teachers have too many rules. They have rules for this, that, and the other. Their rules are verbalized daily and are often posted on the wall. In some classrooms there are so many rules the children initially become confused and exhausted in their attempts to comply with them. Later, they begin to ignore certain rules, then this behavior generalizes to other rules.

Another reason some rules are not successful in altering behavior is that no consequences are stated. A rule without a consequence is as shallow as the sound of one hand clapping. Whenever a rule is made, someone will test it. If nothing happens, he will test it again. If nothing happens, others will test the rule. If nothing happens when they break the rule, it is not a rule, it is simply a non-functional collection of words.

I am aware that when some teachers have conscientiously tried to follow these four recommendations, there are still a few children who occasionally misbehave. In spite of the fact that the teacher has tried to enhance the general atmosphere of her class, has clearly stated those behaviors she expects to occur and those she will not tolerate, praises the good and ignores the bad behaviors, and establishes a few rules with consequences, there are still some children who are disruptive to the extent they interfere with their development or that of others.

Data Collection

When this is true the teacher should immediately begin to obtain data on the irksome behaviors. She should first identify the troublesome behavior and proceed to count the number of times it occurs. After she has obtained these data for a few days, she should decide whether or not she has truly identified the problem. If she has not, that is if the frequency of the pinpointed behavior is not high enough to merit concern yet there is something about the situation that troubles her, she should pinpoint another behavior and proceed to count its occurrence.

If, however, she initially pinpointed a behavior that occurred at a high enough rate to merit concern, she should attempt to change it. Once the decision has been made to modify the behavior, the teacher must determine the extent to which the behavior should ultimately occur. Next, she must select an intervention technique, put it into effect, and continue to monitor the frequency of the behavior. If the rate of the behavior is decelerated to a satisfactory level, she should concentrate her managerial efforts on another behavior. If, however, the behavior was not substantially changed, she must select a second intervention technique and proceed once again. She should continue to select new intervention techniques until the desired frequency is reached.

Throughout the remainder of this chapter I will discuss various techniques which have been used to decelerate certain irksome behaviors. All of these techniques are supported by a fair amount of data. I have elected to discuss first those techniques which have been used with an entire classroom of children, then to present techniques which have been used with individuals in a classroom. Furthermore, I have subdivided those two sections. Within each section I will discuss some techniques which share the feature that some event is given in an effort to attenuate a behavior. I will discuss other techniques where the common attribute is that some event is taken away in order to decelerate the behavior.

Group Tactics

Occasionally a teacher is assigned a classroom which is in a state of absolute chaos. Even after she has implemented the four recommendations I have described, along with others, the class remains intolerable. When she attempted to identify the troublemakers there were many; she was unable to isolate only two or three offenders. When she tried to pinpoint specific behaviors that were troublesome there were dozens. Since there were so many misbehaving children who displayed so many undesirable behaviors, the teacher could speculate that were she to concentrate on one behavior at a time, it would require several months before the classroom was manageable. In instances such as this, I would argue that the teacher should select a group tactic. Following are certain tactics that have been used with groups of children.

Give Something to Attenuate a Behavior

In this section I will discuss three tactics which have been used to attenuate behaviors. The feature they all share is that the manager gives something contingent on a behavior in an effort to decelerate an inappropriate behavior.

Count Behavior of Group, Give Something to All. When this technique is used the manager should first identify the troublesome behavior of the group, count each occurrence of that behavior, then give something to the group contingent on another behavior.

An instance where this technique was used was brought to my attention a few years ago by a young man who conducted several behavioral management projects in a public school. One of his projects was with two fourth-grade boys. The problem with the boys was that they fought with each other a great deal. Therefore, throughout this project the number of fights was recorded. These data were graphed each day.

During the brief baseline phase the teacher did nothing extraordinary to curtail the fights. She learned, during this five-day condition, that there were about seven fights a day.

Throughout the next phase the boys were given an "etch-a-sketch" game and required to write the word "friends." They had to do this before going to the morning recess. When they had completed the task, they were each given a cup of ice cream and sent to recess. During this five-day phase, there was, on the average, one fight per day. Throughout this period the teacher observed, however, that the students argued a great deal as they wrote the word.

Therefore, throughout the third condition she placed a limit on the writing period. Now they had to write the word "friends" within a ten-minute period in order to receive the ice cream. During this five-day period there was only one fight.

In a final phase which ran for five more days, the writing activity and the ice cream were withdrawn. The teacher discovered that the fights did not reappear, however.

Recently, Schmidt and Ulrich (1969) demonstrated that a technique of this type was successful in a regular public school classroom. Their first experiment took place in a fourth-grade class of 23 pupils.

The data kept throughout this study was noise level. This was measured as dbs. Readings were taken on a sound-level meter every three minutes during the baseline phase and every minute throughout the other two phases of the study. These data were recorded daily during a one-hour, free-study period.

Throughout the ten-day baseline period, when no extra procedures were in effect, the average db reading was 53. During the second phase it was explained to the students that a time would be set throughout the period at ten-minute intervals and allowed to run to zero. They were told that if the noise level was satisfactory (below 42 dbs) during an interval they would be given a two-minute break and two minutes would be added to their gym period. The data during this period indicated the average noise level was 37 dbs.

Throughout a third phase the timer was not used and the noise level went up. Throughout a final phase the timer and free-time were reinstated, whereupon the noise level once again was attenuated.

Throughout a second experiment, data were again kept in regard to sound level, and in addition, out-of-seat occurrences and teacher reprimands were recorded. This experiment was conducted in a second-grade class of 28 children.

Sound level data and out-of-seat data were recorded every minute. Teacher reprimands to the class were indicated by an "x" recorded beneath the ten-second interval space in which it occurred.

The data were obtained during a morning reading period which lasted one hour. Throughout the 11-day baseline, no experimenter-arranged contingencies were in effect. The mean decibel level during this period was 52. Meanwhile, the average number of out-of-seats was 150, and the average number of teacher reprimands was 17.

During the second phase a timer device was set to ring every five minutes. If the sound level was less than 42 dbs for five minutes a buzzer went off. The timer was then reset. The pupils were given two extra minutes for gym each time the buzzer sounded. If they were too noisy during a five-minute interval, the timer was reset. During this phase the noise level was reduced to an average of 38 dbs. The average number of out-of-seats remained at 150, and the mean number of reprimands decreased to 7.

During the third phase the pupils were required to earn all their gym time by being quiet. At this time, they were given three minutes for each five-minute interval they were "quiet." An individual contingency was arranged in this condition. Pupils who made noise in excess of 42 dbs lost five minutes of gym time. Another individual contingency was also arranged; this one for out-of-seats. To administer this contingency a variable interval timer was set. Each time it went off the class was scanned. Those pupils who were out of their seats when the buzzer sounded lost five minutes from their recess time.

The results from this phase revealed that the average db level remained at the level of the preceding phase, about 38 dbs. The frequencies of being out-of-seat and teacher reprimands both decreased, however. The average number of out-of-seats was two, while the mean number of reprimands was one.

During a fourth condition the baseline procedures were reinstated. The data from this period indicated the mean db level went up slightly, to an average of 40, while the average number of out-of-seats and reprimands remained about the same.

Psychologists would refer to the technique used in these studies as "differential reinforcement of another behavior" (DRO). In the first study fights were measured, whereas in the second, noise level was recorded. The "other" behavior that was reinforced in the first study was writing the word "friends." The other behaviors which were reinforced in the second experiment were periods of quiet. Many behaviors could have occurred and would have been reinforced during those periods, so long as they were quiet behaviors.

Another example of the use of this technique with groups would be to measure the number of out-of-seat occurrences for all the pupils. In an attempt to reduce those behaviors, the pupils could be given extra time or a favored activity if the total number of out-of-seat events was less than a specified number. This technique could also be used to decelerate talkouts, tattling, or many other undesirable behaviors.

Count Behavior of Two Groups; Give Something to the Group. This group technique has been exemplified in recent years by the Good Behavior Game. Although this technique has stimulated a fair amount of research, the first behavior game article was written by Barrish, Saunders, and Wolf (1969).

Their study took place in a fourth-grade classroom of 24 students. There were several students in this class who had been sent to the

principal for such problems as indiscriminate noise, talking, out-of-seat behavior, and other disruptions.

Throughout the study two disruptive behaviors were measured: out-of-seat occurrences and talkouts. These behaviors were recorded for all members during a 30-minute reading period and a 30-minute arithmetic period. In order to obtain these data observers used recording sheets which were divided into squares, each of which represented one minute. If any child emitted either target behavior, a check was made in the row assigned to the behavior, in the square which represented a particular minute.

During a baseline period when no special rules or contingencies were associated with either talkouts or out-of-seats, it was reported that during reading and arithmetic, talkouts were indicated about 96% of the time and out-of-seat occurrences were noted during 82% of the intervals.

Following the baseline the game was introduced. First the class was divided by rows into two teams. The teacher then explained that out-of-seat occurrences and talkouts were to be recorded. These behaviors were defined and explained to the youngsters. The teacher informed the students that whenever one of them engaged in either behavior a mark would be placed on the chalkboard for his team. It was also explained that the team with the fewest marks at the end of the day, or if either team had fewer than six marks, would win. The members of the winning team would be allowed to wear victory tags, put a star by their names on the winner's chart (this chart was divided into two sections, one for each team), line up first for lunch if one team won, or early if both teams won, and take part at the end of the day in a 30-minute, free-time period during which time they could work on special projects. The youngsters were informed that the losing team would not receive these privileges.

During the second condition of this experiment the game was in effect during only the math period. During this time the percentages of both target behaviors dropped considerably: 19% for talkouts and 9% for out-of-seats. Meanwhile, the percentages these behaviors occurred during the reading period remained about the same as they were during the first part of the study.

Throughout the next condition, the game was not scheduled during the math period but was arranged during the reading sessions. At this time the percentages of the two behaviors during math rose to baseline proportions, but decelerated to about 12% during reading.

During a final phase the game was reinstated for math and continued to be used in reading. These data indicated that the percentages for both behaviors were from 10 to 20%.

Psychologists would also refer to this technique as DRO. The other behaviors that were reinforced in this study were any behavior except talkouts and out-of-seats. Sociologists would, of course, refer to the contingency in this study as a modified competitive arrangement, because

only one team could win if they had fewer marks than the other team. Of course both teams could win if fewer than six marks were recorded.

Teachers could use this technique during any class period. For example, if she wanted to decrease the frequency of unsportsmanlike remarks during gym period, she could arrange teams, count the frequency of those remarks, and reward the winner.

Count Behaviors of Individuals; Give Something to Individuals.

When this technique is used a behavior is first identified that should be decelerated. Then the individual occurrences of this behavior should be noted periodically. A contingency should then be arranged individually so that each person can receive something when he does not emit the target behavior.

An example of this technique is the "Timer Game." The original research which explained the procedures for this game was published in Exceptional Children. The research was conducted by Wolf, Hanley, King, Lachowicz, and Giles (1970).

The youngsters in their study were 16 low-achieving children in a remedial class. Fourteen of the pupils were fourth-graders and two were from the third grade.

Throughout this study the out-of-seat behaviors of the pupils were recorded. These behaviors were recorded every 30-second interval from one hour each day. During each interval the observer surveyed the class and noted which children were out of their chairs. Each day the average number of out-of-seat occurrences per hour was plotted.

During the baseline phase, which ran for seven days, the timer game was not in effect. At this time the frequency of out-of-seat events was high. On the average, 17 intervals out of 120 containing out-of-seat behavior per child were recorded per session in the baseline.

Throughout the second condition, which lasted six days, the timer game was used. During this period a kitchen timer was set to ring on the average of once every 20 minutes (range from zero to 40 minutes). Every student who was in his seat when the timer rang was awarded five points. Points could later be traded for such things as snacks, clothes, field trips. During this phase the average number of intervals each child was out of his seat was reduced to two.

Following this phase a condition was scheduled where the baseline procedures were reinstated. That is, the game was no longer in effect. Throughout this phase, which ran for seven days, the number of out-of-seat responses increased to an average of 17 intervals per child.

Once again psychologists would refer to this technique as DRO. The other behaviors which were reinforced with points were any behaviors except being out of ones chair.

This type of technique could be used most effectively in a small class, such as the one in the Wolf study. In such cases the teacher or

another observer could possibly record a single behavior for each individual. It is also possible that with a smaller class different behaviors could be pinpointed for the various children and the timer game could be involved. For example, the out-of-seat behavior for one child could be noted, the staring of another, the talking out of a third, and so forth.

Take Away Something to Attenuate a Behavior

In this section I will describe only one technique that has been used with a group. Later, in the section devoted to individual techniques, I will discuss three techniques where some event is taken away in an effort to attenuate a behavior.

Count Behaviors of Group, Take Away Something From All. When this technique is used a behavior should be identified which could be emitted by most members of a group. Each occurrence of this behavior should be counted, then something should be withheld from all the group members.

An example of this technique was published a few years ago by Sulzbacher and Houser (1968). Their study took place in a classroom for educable mentally retarded youngsters. There were 14 children in the class, whose ages ranged from 6½ to 10½.

The behavior of concern in this project was called the "naughty finger." Throughout the study the teacher counted the frequency of this behavior (raised fist with middle finger extended) and verbal references to that behavior.

During a nine-day baseline no unique effort was made to curtail the frequency of the target behaviors. On the average, 16 occurrences of the naughty finger or references to it were noted.

Prior to the second phase, a set of ten cards was mounted in the front of the room and numbered ten through one. In addition, it was explained to the children that there was to be a special ten-minute recess at the end of the day. However, each time the teacher saw a "naughty finger," or heard reference to it, she would turn over one card. At the end of the day they would have as many minutes for recess as were indicated by the card.

This phase lasted for 18 days. Throughout this period the frequency of the target behaviors was greatly reduced. On the average, there were three incidents each day.

During an eight-day phase which followed the cards and extra recess were removed. Correspondingly, the frequency of the behaviors increased.

Psychologists would refer to this technique as response cost, the contingent withdrawal of specified amounts of the reinforcer. Before this technique could be used, it would first be necessary to identify a reinforcer. (Apparently recess time was reinforcing for the pupils in

this study.) Once a reinforcer is identified, an undesirable behavior should be defined, then portions of that reinforcer should be withdrawn contingent on occurrences of the specified behavior. Then, if that behavior was attenuated, the procedure could be referred to as response cost.

Other teachers have used this technique by altering the card technique to marks on the chalkboard. This tactic could be used in an effort to attenuate other troublesome behaviors such as talkouts or out-of-seats. The event which could be withdrawn could also be modified. It could be minutes from art, music, story time, or from a scheduled field trip.

Individual Tactics

In this section I will describe various approaches for dealing with individual problem behaviors. As was the case with the group tactics, I will first present techniques where something is given to decelerate the target behavior, then various approaches where some event is taken away.

Give Something to Attenuate a Behavior

In this section I will discuss six different techniques for attenuating behaviors. They have in common the feature that something was given for the target behavior, or another behavior, in an effort to decelerate the frequency of the target behavior.

Give Something Contingent on Behavior. When this technique is used the manager presents something to the pupil contingent on his emitting the target behavior. In the Applied Behavior Analysis literature there are many studies of this type. One investigation which used this technique was published by O'Leary, Kaufman, Kass, and Drabman (1970).

The subjects in their study were two boys; they were members of a regular second-grade class. Throughout the study the boys were observed for 20 minutes a day during an arithmetic period. Observations were made every 30 seconds in regard to several types of disruptive behaviors: out-of-chair, touching other's property, vocalization, noise, aggression, time-off task. The measure which was graphed each day was the mean frequency of disruptive behavior. This was calculated by dividing the total number of disruptive behaviors by the number of intervals observed. Throughout the investigation the number of teacher reprimands was also counted.

Throughout a baseline phase the teacher was asked to manage the children as she ordinarily would. Since few soft (individual) reprimands were given during this time, the first phase was referred to as the loud reprimand condition. The data from this period indicated the mean frequency of disruptive behaviors for the two boys was 1.1 and 1.4.

During the second, or soft reprimand phase, the teacher was asked to use soft reprimands. She was told to speak to the offending child so that only he could hear her. She was also asked to maintain the same rate of giving reprimands she had throughout the first condition. The data from this phase revealed that the mean frequency of disruptive behavior decelerated for both boys, down to .8 and .6.

Throughout a third phase the teacher was told to give loud reprimands again. The data from this period were similar to those from the first two phases in that the mean frequencies went up when the reprimands were loud, and down when the reprimands were soft.

The authors discovered in their study that the frequency of reprimands was not constant throughout the phases. They learned that the teacher gave fewer reprimands during the soft than in the loud phases. Therefore, a replication study was conducted, during which they controlled for the frequency of reprimands. Their data in this study were very similar to those of the first investigation.

A second investigation of this type was conducted by Hall and his colleagues (1971). In one of the studies in their report the topic pupil was a seven-year-old girl in a classroom for trainable mentally retarded children. The behavior of concern throughout the study was the number of times each day she pinched herself or someone else. Daily, the frequency of pinches was recorded.

During a six-day baseline phase no specific technique was used to reduce the number of pinches. The frequency of pinches, throughout this phase, averaged 71.8 per day. In the next phase the teacher pointed her finger at the girl and said "no" in a loud voice following each pinch. The average number of pinches over this 18-day period dropped to 5.4 each day.

A brief third phase was scheduled during which time the pointing and saying "no" routine was removed. Her rate of pinches rose to an average of 30 per day. In a final phase, when the contingency was again instituted, her average rate fell to 3.1 each day.

Our psychologist friends would refer to the procedure used here as punishment, that is, if the technique effectively reduced the target behavior. For punishment, like reinforcement, is defined by its effect on behavior. A definition of punishment would be "a procedure whereby the presentation of an event contingent on a behavior reduced the rate which that behavior occurred."

Other events which have or could possibly be used to decelerate irksome classroom behaviors would be slaps, frowns, or scoldings. One of the favored events of yesteryear was to require pupils to stay after school contingent on some naughty behavior. Speaking in behalf of my Burrton grade school colleagues, this was a painful procedure. It is doubtful it was a punishing event, however, for our rates of naughtiness were not greatly reduced by this technique.

Give More of the Event to Reduce the Desire for the Event. If the manager wishes to use this technique he should give the subject a large dose of the event. He could give this extra dose either contingently or non-contingently. Some years ago Allyon published a report which illustrated the effectiveness of this technique (1963).

The subject in his study, which was published along with two others, was a woman who had been in a psychiatric institution for nine years. The behavior of concern was the hoarding of towels. Although many efforts had been made to discourage hoarding, she continued to accumulate towels. Periodically a nurse went into her room and removed them.

Throughout this study data were kept and plotted in respect to the average number of towels per week. In order to arrive at this figure a nurse went into her room about three times a week, when the lady was not in, and counted them. During a baseline period when no special procedures were in effect the average number of towels each week in her room was 20.

During the second phase of the study the nurses took towels to the patient's room when she was there. They simply handed them to her and left. During the first week they delivered seven towels each day, and by the third week she was given 60 towels a day. When the number of towels reached 625 she began to return a few. Thereafter, no more towels were taken to her room. Throughout the next year the mean number of towels in her room was 1.5 per week. This was an ordinary amount.

Psychologists would refer to this technique as stimulus satisfaction. Often, when individuals are given too much of a good thing, that thing, which had been reinforcing becomes aversive.

Although little data has been gathered in regard to the involvement of this technique as a means for reducing naughty classroom behaviors, several teachers have unsystematically used this approach. For example, I have heard of instances where a boy who was out of seat a great deal of the day was required to remain out of his chair for an extended period of time, contingent on each occurrence of behavior. Another incident that came to my attention was of a child who was required to give a long speech to his classmates contingent on each talk-out incident.

Give something for Reciprocal Behavior. When this technique is used the program manager should first identify the behavior of concern, then identify a behavior which is the opposite of the first behavior, then proceed to reinforce the latter behavior. This technique was used in one of the first Applied Behavior Analysis studies. This was the classic study reported in JEAB by the Zimmermans (1972). Their study took place in a residential treatment center.

One of the subjects in their report was an 11-year-old boy. The behavior of concern was spelling. When he was called upon to spell a word he made faces, paused, and said a series of unrelated letters. Generally, the teacher coaxed him to try to spell the word, asked him to sound out the word, and gave him cues. Only after the teacher had spent considerable time with the boy would he correctly spell the word. The

teacher noted that over a period of 10 to 15 class sessions, when this technique was used, it took the boy more and more time to spell each word.

After several weeks the teacher altered her procedure. During this phase she asked the pupil to come to the chalkboard and spell some words. When he was asked to spell the first word he misspelled it more than 10 times. The teacher ignored him after each abortive attempt. During this time he complained that he could not spell the word. After about 10 minutes of dawdling and scribbling, he wrote the word correctly, whereupon the teacher immediately looked at him, smiled, and said "good." She then read the next word to him. After a series of errors and complaints he spelled that word correctly. During this session 10 words were given the boy. He took successively less time to spell each word correctly.

On the following day, the teacher continued to use this procedure. That is, she gave attention in the form of smiles and conversation contingent on correct spelling. She ignored any behavior that did not contribute to good spelling.

Another example of the use of a reciprocal technique was an investigation reported some years ago by Sloane, Johnston, and Dijou (1967). The subject of their study was a $4\frac{1}{2}$ -year-old boy whose behavior was characterized by extreme aggressiveness and excessive fantasy play. The study took place in a small remedial school for children with behavior disorders.

Throughout the study fantasy play and appropriate play were recorded. Fantasy play was defined as explicit verbal statements which referred to himself or others as imaginary characters, or actions which carried out such a role after it was verbalized. Appropriate play was defined as those periods when the boy talked about himself and did not construct a scenario for his playmates. A 10-second, time-sample recording technique was used to obtain data. Each day two percentage plots were graphed: percent of fantasy play and percent of appropriate play.

During the 19-day baseline period adults generally entered into the boy's fantasies. They rather willingly played the roles designed for them. The average percent of time engaged in fantasy play throughout this period was 35%, whereas on the average, he engaged in appropriate play 39% of the time.

The interaction procedures were altered throughout the second phase of the project. At that time the boy received no social reinforcement or attention if he engaged in fantasy play. He was, however, attended to each time he was observed to be playing normally. By the end of this period the percentage of time he engaged in appropriate play rose to 60%. Meanwhile, toward the end of this condition, his time spent in fantasy situations fell to about 2%.

Throughout a final phase, social reinforcement was intermittently arranged for the topic child and the other children in the group. His

percentage of time engaged in appropriate play increased throughout this condition. On one day his score reached a peak of 30%. His time spent in fantasy play continued to be brief, on the average about 3%.

Psychologists would refer to this technique as DRO. This contingency has been explained earlier.

In order to use this technique the teacher must identify two reciprocal behaviors. They must be mutually exclusive, in that as the rate of one goes up, it is likely the rate of the other will go down. Teachers should, furthermore, keep a record of both behaviors the way Sloane and his co-workers did. They should then reinforce the behavior they want developed (generally the low rate behavior) and ignore the behavior they want attenuated (generally the high rate behavior).

This technique could also be used with the favorite of all naughty behaviors, out of seats. The manager could count the percentage of time a pupil was in his seat and the percentage of time out of seat. She could then focus her attention on in seat, rather than out of seat behavior.

Give Something for Incompatible Behavior. When this technique is used the teacher must find a behavior that is incompatible with the target behavior. She should then try to increase the rate of that behavior. Often, when this happens the rate of the target behavior decelerates. This technique is very similar to the one just discussed, except in the former instance the reinforced behavior was the direct opposite of the target behavior.

In 1968 the Pettersons published a study that exemplifies this technique. The subject in their study was an eight-year-old boy. The boy was in an institution for the mentally retarded. Although he was ambulatory, he had no speech and was not toilet trained. The topic behavior in this research was the frequency of self-injurious responses. The boy slapped his head, hit his hand against his teeth, banged his forehead against his arm, and struck his head and hands on chairs. As a result of these responses, his face, arm, and legs were often covered with bruises and abrasions.

The study took place in a small room. The subject was seen several times a week; the typical session lasted 15 minutes. Throughout the sessions each response was tallied. Later, those responses were graphed as self-destructive responses per minute.

Throughout the 12-day baseline the sessions lasted only five minutes because of the severity of the child's behavior. During the second phase of the project reinforcement in the form of food (one quarter teaspoon) and the word "good" were given contingent on a three to five second interval where no self-injurious responses were observed. If a self-injurious response occurred, the experimenter took the food from the table, turned away, and counted for 10 seconds. If a self-injurious response did not occur during that period the child was given a bit of food and the experimenter said "good." This phase lasted for 10 sessions. The rate of self-injurious responses fell from a baseline rate of 27 per minute to an average of 14 per minute.

The procedure was altered throughout the third phase. Reinforcement continued to be given following a brief period where a behavior other than a self-injurious response occurred. In addition, contingent on a self-destructive response, the subject was given a verbal and gestural instruction to walk across a room and sit in a chair. The rate of injurious responses was further attenuated during this phase, to an average rate of 12 per minute.

During a brief fourth phase a reversal of contingencies was scheduled. Now the subject was told to walk from one chair to another, not contingent on a self-injurious response, but until one occurred. When it did the child was given food. During this time food was not given for intervals where self-destruction was not observed. During this period the average rate of self-injurious responses was 15.

Throughout a final phase of the project the procedures were as they had been during the third phase. His mean response rate was about two self-injurious responses per minute during this phase.

Psychologists would refer to this procedure as DRO. Any behavior other than a self-injurious response was reinforced. It should also be noted that in this study the concept of "reversal" was used in its original context. That is, the behavior that was targeted for deceleration was, during one phase, reinforced. Often, when the term reversal is used it refers to the fact that reinforcement was removed, and as a result the rate of the dependent variable reversed.

Give the Target Event Contingent on Periods of Doing Something Else. This is a rather unique way to arrange a situation in an effort to decelerate a behavior. The only study that I know of where this technique was used was a 1963 report in JEAB written by Homme and his colleagues.

In that report Homme et al. explained how they invoked the Premack principle with a group of very active three year olds enrolled in a nursery school. They observed throughout a three-hour period that the youngsters enjoyed running around the room, screaming and pushing chairs. It was also noted that the children did not enjoy sitting quietly, looking at the chalkboard, or attending to instructions from the adults.

In order to involve the Premack principle, they labeled the first set of occurrences as high-probability behaviors and the latter group as low-probability behaviors. They noted, and correctly, I might add, that most of the high probability behaviors were behaviors which would ordinarily be targets for deceleration. Furthermore, most managers would use punishment techniques in efforts to attenuate them.

Instead of arranging punishing contingencies to decelerate the rate of the naughty behaviors, Homme and his friends cleverly used those events as reinforcers. They arranged situations whereby the pupils were allowed to run around the room and scream and push chairs if they first sat quietly in a chair and attended to the chalkboard. After they ran around for a while a signal was given for them to return to work. At

another signal they could run and scream. Thus, periods where low and high probability behaviors could occur were alternated.

The authors claimed that when this procedure was followed, control was nearly perfect after a few days. The amount of time the children engaged in productive activity when the Premack technique was used was much greater than it was before its involvement. Although they reported no data in regard to the change in the amount of time the children spent running and screaming when this activity was contingently arranged, we can assume that the rate of this behavior decreased.

I'm not certain what psychologists would label this technique. Perhaps they would also refer to this technique as DRO, since a behavior other than the behavior targeted for deceleration was reinforced.

Teachers could consider other uses for this technique. My wife, for example, is teaching a junior high chorus and one of the high probability behaviors is gossiping, or at least talking in small groups. One of the low probability behaviors is singing. She has considered arranging periods of gossip (a behavior she would like to decelerate or at least control) contingent on periods of singing.

Another possible way to use this technique would be to arrange one troublesome behavior contingent on the low rate of another troublesome behavior (reinforcement of a low rate behavior is the topic of the next section). For example, if a boy talks out and is out of his seat a great amount of time, an arrangement could be made so that he can walk around the room for a while if, for a period of time, he did not talk out. Perhaps the rate of both behaviors would decelerate as a result of such an arrangement.

Give Something if the Frequency of the Target Behavior is Low. When this technique is used the manager arranges a situation where he will grant some consequence to the pupil if the rate of the undesirable behavior is lower than some established rate.

A recent use of this technique was published by Dietz and Repp in JABA (1973). The pupil in their study was an 11-year-old boy. He was classified as trainable mentally retarded and was enrolled in a special class. According to his teacher he was the most disruptive student in the class.

The topic behavior throughout the study was talk outs. These incidents included talking without permission, singing, or making statements not related to the ongoing class discussion. Data were recorded for 50 minutes each day in the classroom. Each talk-out occurrence was tallied and later graphed as responses per minute.

Throughout the 10-day baseline no specific techniques were scheduled in an effort to decelerate the talk outs. At this time he emitted, on the average, 5.7 talk outs per 50 minute session.

In Phase 2 the talk outs were defined for the pupil. He was also told that if he made three or fewer talk outs during the session, he

would be given five minutes of free time near the end of the day. During this phase he had about one talk out each session; he earned the five minutes every day.

Throughout a brief final phase, the contingency was withdrawn. Consequently, his rate of talk outs increased slightly.

There were two other experiments in their investigation where the same type of contingency was arranged with groups of children. In one study the subjects were 10 trainable youngsters. The behavior of concern was talk outs. In the other study, the subjects were 15 senior high girls. The topic behavior was "subject changes." In both studies the contingency described earlier was effective.

Psychologists would refer to this technique as "differential reinforcement of a low rate of responding" (DRL). Although a fair number of basic operant studies have been published which used this schedule, very few applied investigations have been reported.

Teachers could consider using technique if their management objective was to reduce the rate of a behavior to a tolerable level, or this technique could be used to eliminate, by stages, a troublesome behavior. Several classroom examples come to mind where this technique might be used. One would be with out-of-seat occurrences. An arrangement between the teacher and pupil could be made whereby the pupil would be awarded free time or a favored activity if he was out of his chair fewer than a specified number of times. For that matter, I believe this technique could be used with most of the irksome behaviors.

Take Away Something to Attenuate a Behavior

In this section, three techniques will be described. In each instance the manager took something away from the pupil in her effort to decelerate a naughty behavior.

Take Away Opportunity to Obtain Reinforcement, Contingent on Target Behavior. When this technique is arranged the teacher must be able to send the pupil, contingent on a specified behavior, to a place where no or minimal reinforcement is available. A study which illustrates this technique was recently published by Clark and his associates (1973).

The subject in their study was an eight-year-old girl. She had been diagnosed as a mongoloid. According to some adult managers she displayed several disruptive and dangerous behaviors. The study took place in a preschool classroom for problem children.

Throughout the study three types of behaviors were recorded: chokes and armwraps, other attacks toward people, and attacks toward materials. These behaviors were recorded on a 10-second interval system. A given category of behavior could be scored only once per 10-second interval. These observations, taken 60 minutes each day, were

later charted as the number of 10-second intervals per hour which contained the disruptive behavior.

In this study a multiple baseline design was used. During the baseline phase the teacher ignored all disruptive behaviors and attended to the girl when she engaged in non-disruptive behaviors. Occasionally, however, the teacher attended to the girl when it was necessary to stop her from hurting another child. During this time there were, on the average, 15 chokes and armwraps per hour. On the average there were 15 intervals where attacks on other people were noted, and six intervals where attacks on materials were observed.

In the second condition the time-out contingency was associated with only chokes and armwraps. Whenever she emitted a behavior from this category she was placed in a time-out booth and the door was closed. After a three-minute period she was released, provided she did not cry or bang on the door during the final 15 seconds of the period. During this time the frequency of chokes and armwraps was greatly reduced. Meanwhile, however, the frequency of the other behaviors increased.

Throughout a final condition the time-out procedure was in effect for all three behavioral categories. The number of intervals per hour the behavior occurred during this time was very low.

During a second experiment the authors investigated the effects of intermittent schedules of time out. The same pupil was used in this experiment and the same behaviors were recorded. The results of this study indicated that some schedules of intermittent time out may be as effective as continuous time out.

Some years ago I helped conduct a project where this same technique was used (Lovitt, Lovitt, Eaton, and Kirkwood, 1973). The principle subject in this investigation was a nine-year-old boy. The setting was a class for learning disabled children.

Throughout the project the teacher noted the frequency of inappropriate remarks. These verbalizations were generally about sexual or bathroom topics. During a baseline phase, which ran for several days, no special technique was programmed. The teacher, following each remark, generally frowned and told the pupil that he should not use such language in the classroom. On the average, there were about three of these remarks each day. On one day there were seven.

During the next condition of the study a time-out procedure was used. During the baseline phase the teacher had observed that the subject enjoyed chatting with a young man who sat near him. Apparently they had become rather close friends.

Prior to the treatment phase the teacher talked with the subject's friend and asked if he would help with an experiment. He agreed and she explained that from now on whenever the subject made one of his remarks the friend was to go to him and tell him he did not like to sit by him when he talked like that. The friend was also told to pick up his books

and move to another chair some distance from the subject. Finally the friend was told to come back and sit by the subject after a period such as reading had ended. When he returned he could continue to chat quietly with the subject. The data throughout this condition indicated the technique was effective, for after a period of two weeks there was rarely an instance when the subject emitted one of his choice remarks.

Psychologists would, of course, refer to the procedure used in these studies as time out. This technique has been defined as the removal of a source of reinforcement contingent on a response. This technique, like other Applied Behavior Analysis techniques, can be labeled only after behavioral effects have been observed. If the technique used in the Clark *et al.* study had not altered the target behavior, it would be inappropriate to refer to it as time out. The procedure would more accurately be labeled "putting the girl in a room for three minutes after she emitted a troublesome behavior," nothing more.

Some teachers have sent children outside the room contingent on some undesired behavior and discovered, as a result, that the rate of the undesirable behavior went up. Whereupon they claimed that the time-out procedure is not a good one. Their mistake was, perhaps, that instead of removing a source of reinforcement contingent on a response, they increased the availability of reinforcement. For many children it is far more reinforcing to be outside a classroom than to be in it. If time out is to be used effectively the teacher must first identify a situation where reinforcement may be obtained. She must then remove the pupil from that situation contingent upon a selected behavior.

Take Away Some Event Contingent on the Target Behavior. When this technique is used the teacher should withdraw some reinforcing event from the pupil contingent on an undesirable behavior. Hall and associates (Hall *et al.*, 1971) published a study which exemplifies this technique.

In that investigation the pupil was a resident in a home for emotionally disturbed boys. Throughout the study three behaviors were recorded: cries, whines, and complaints. These behaviors were recorded during two 30-minute periods: reading and math. The three behaviors were grouped and daily plots in reading and math were entered.

During the baseline condition no special technique was scheduled. On the average, six target behaviors were recorded during reading and seven during math.

Throughout the next phase a withdraw contingency was scheduled during the reading period. At the beginning of the reading session the boy was given five slips of paper bearing his name. He was told that one slip would be taken from him each time he cried, whined, or complained. In this period the frequency of the target behaviors fell to zero in reading. The rate of the target behaviors increased, however, during the math period.

In the next phase the slips were also taken away during the math period. The data now indicated that the frequency of the target behaviors was low in both classes.

Following this phase a condition was scheduled where the baseline procedures were once again in effect. During this period the frequency of the identified behaviors increased in both classes. During the final phase the withdraw contingency was reinstituted. The target behaviors rarely occurred in this final phase.

Psychologists would refer to this technique as response cost, which has been defined as the contingent withdrawal of specified amounts of the reinforcer. As was pointed out in reference to time out, the teacher must first identify a reinforcer before she can withhold it. It should be pointed out here that one of the distinguishing features between response cost and time out is that when the former is used, an amount of the reinforcer is removed; when the latter procedure is arranged, an amount of time is taken away (that is, time away from the source of reinforcement).

This technique could easily be used as a possible means for decelerating several behaviors. Slips, tokens, or other objects could be withdrawn contingent on some response or minutes away from recess or favored activities could be withdrawn. The reader will recall that earlier in this article, in the section which pertained to groups of children, Sulzbacher used a response-cost contingency to decelerate the frequency of naughty gestures.

Don't Attend to Target Behaviors. When this technique is used in an attempt to decelerate a behavior, the manager should ignore, socially and otherwise, the behavior when it occurs. In one of the first "operant conditioning" studies this technique was used to attenuate a behavior. This was a study written by Williams which appeared in 1959.

The subject in this report was a 21-month-old boy. He had been seriously ill for much of his brief life. At the time of the study he was in good health. He continued to demand, however, the special care and attention he had received over the many critical months of his life. He was particularly demanding of attention at bedtime and often if his parents did not attend to him he engaged in tantrums.

Throughout this study, therefore, the behavior of concern was the duration of screaming and crying after being put to bed at night. Daily, this amount of time was graphed.

Prior to the involvement of a systematic technique the parents attended to his nighttime demands. Ordinarily, if one of them put the child to bed, then left, the boy would scream and fuss until the parent returned. As a result, a parent generally stayed in the bedroom until the boy went to sleep. During this period, although no data were kept, a parent would spend from one-half hour to two hours each night in the bedroom waiting for the boy to go to sleep.

After the parents had received reassurance from a doctor that the boy was in good physical condition and did not need their constant presence at night they decided on a different procedure. Now the parents, once the bedtime pleasantries were finished, placed the boy in bed, left the room, and closed the door. The first night this procedure

was followed the boy yelled and screamed for 45 minutes before he went to sleep. This procedure was continued, however, and within seven days the boy did not cry at all when placed in his bed.

After a period of time an aunt put the boy to bed one night and he fussed. Whereupon the aunt returned to the bedroom and remained there until he went to sleep. It was, therefore, necessary to ignore the behavior once again. As before, the parents placed the child in bed and left. The first night he cried and screamed for 52 minutes. Once again, however, his nighttime crying was eliminated within seven days.

Psychologists would refer to this technique as extinction and would define it as a procedure in which behavior that has been previously reinforced is no longer reinforced. As was the case with other procedures, extinction cannot be effective unless a reinforcer which is maintaining the behavior is identified and then removed.

I have often heard teachers say they are going to extinguish a behavior by ignoring it. Such a procedure will be effective only if their attention was, in fact, a reinforcer which was maintaining the behavior. Many times when teachers ignore a behavior and discover that the behavior continues to occur, learn, or should learn, that they have been replaced. They discover that other classroom events or the peer group are more motivating than they are.

Final Remarks

When it comes to selecting a deceleration technique the manager should consider many of the same features he would when selecting a technique to increase the rate of a behavior. One consideration would be the cost or the complexity involved in administering the procedure. It appears to me that certain types of punishment, response cost, extinction, satiation, DRO, and DRL are rather inexpensive and easy to administer. Easy, that is, once the target behavior has been defined and the manager has learned to be consistent in the delivery of the technique. Of these techniques, perhaps certain time-out arrangements would be the most difficult to arrange and administer. For one thing a room or other space is often associated with time-out arrangements. Rooms are often difficult to come by.

Effectiveness is certainly another consideration. However, when it comes to comparing the various procedures across behaviors and types of subjects the data are, at best, difficult to interpret. Extinction, for example, particularly when associated with another procedure has been used to decelerate glasses throwing, tantrums, crying, various disruptive and aggressive behaviors. Time out has been used to attenuate such behaviors as tantrums, pinching, and fighting. Punishment and DRO procedures have also been used to decelerate a wide range of behaviors from self-injurious behaviors to making poor grades on tests. Few studies, however, are available in respect to response cost, satiation, and DRL.

Such a state of affairs presents a challenge for Applied Behavior Analysis researchers. Dozens of important studies could be arranged which set out to compare the effectiveness of the various decelerating techniques. Although the picture is none too clear for teachers or other managers since they do not know exactly which procedures should be used with which behavior in their efforts to maximize the probability of success, this listing of procedures should serve at least to increase the repertoires of many managers. Although many teachers are aware of techniques such as punishment, extinction, and time out, some may not be aware of techniques such as satiation, DRL, and DRO.

Furthermore, the comments offered in this chapter could have altered the conceptions some teachers may have held about various procedures. I tried throughout to stress the idea that most of the techniques were defined by effect rather than by specific events. If teachers keep this in mind the range of potential techniques should be increased. For instance, some teachers have thought of time out as the use of some room to place a child when he is naughty. There is some reason for making this association, for isolation rooms have often been used to time out children. Time out, however, has been used in academic settings as a technique to decrease errors. In those instances, if a person could obtain reinforcement by answering certain items correctly, the program could be made unavailable if he commits an error. Thus the opportunity to obtain reinforcement is temporarily withheld.

Similarly, many people have associated punishment with electric shock. Once again it is easy to understand how this association was made, for several studies used shock as a punishing contingency. However, if we keep in mind the definition of punishment, that it is determined by effect, many other events, e.g. a frown, could serve as a punisher.

I must add one final note to this chapter and that pertains to the total responsibility of the teacher. It is her job to reshape the people assigned her, be it a class for the trainable mentally retarded or a regular fifth grade. It is her responsibility to alter several academic and social behaviors of her pupils. In so doing she must, from time to time, decelerate certain behaviors, particularly if she has determined those behaviors interfere with the development of the subject or of others. In those instances she must select one of the techniques recommended here or use another procedure. She must also, however, assist the pupil to learn and develop other, more negotiable and satisfying behaviors. For if she only decelerated behavior it is possible a rowdy child could be turned into a youngster who merely sat. In summary, teachers should decelerate behaviors only to the extent those efforts aid in the development of other behaviors.

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CHAPTER 9

CONCLUSION

Review of Program Project Findings

All too often, superstition and hunch have dictated the teaching practices used and the materials selected in our schools. In the past, many teachers have used traditional theories which may or may not ever have been confirmed by the systematic measurement and analysis of child performance in a classroom. Other teachers use commercial programs which embrace a whole instructional strategy and yet have never been confirmed by careful controlled measurement and analysis as effective ways of teaching children. In special education or other remedial situations where the goal is to bring the child up to grade level, or in any educational setting, time must not be wasted on activities which are not functional for the individual student. We need to spend our time on the really important tasks of instruction.

In this chapter the components or essential elements of the preceding chapters are condensed, resolving those components into principles that can be used to recommend future activity in order to improve teaching. These elements include a discussion of measurement strategies, of ways in which we can arrange information in developing the instructional design, and ways in which we can effectively assess performance, progress, and learning. The suggestions we have formulated from our Program Project research are not only for teaching, but also for research as they pertain to the learning hierarchy and to specific instructional tactics and techniques. We want to move away from superstition to broad-based instruction which will aid all our children. We want to prevent teachers from wasting valuable time and energy on strategies that do not accomplish what they are supposed to; to prevent the loss of interest and enthusiasm often seen in students as they move through school; and to prevent the frustration experienced by those facing adult life inadequately educated.

The information in this volume was gleaned from almost a decade of research into how children do learn. The ideas presented here need not be confined to the specific curriculum areas and examples covered here; they can and should be generalized to all areas and aspects of teaching. They can also be applied to many kinds of educational research projects.

Direct Daily Data

One of the most important basic procedures discussed in this book is the direct daily measure of child performance. We have explained that measures are used both to establish what responses the child has initially and to evaluate the progress he makes daily, and to refine the instructional materials and procedures that we use.

The use of data can help the teacher become more objective in making decisions about the use of instructional techniques. We all view the world through our own perceptions, and all teachers want to believe that they are effective. Sometimes teachers might falsely believe a procedure is effective. For example, they might feel that using flash cards has been very effective in helping children learn vocabulary. Direct, daily data on a vocabulary task, however, might indicate the reverse. On the other hand, we have had cases here at the Experimental Education Unit, and in the field, in which teachers felt they were not effective, and had not helped children progress in academic and social skills. However, when the data were analyzed, the teachers found out that the children were improving.

Sometimes improvements the child makes are very small. It is reasonable to say that a teacher, no matter how effective he or she is, cannot always recognize change in a child's performance. Data should be taken, but just taking daily data will not solve the problem. It is very difficult to determine change by reading a column of numbers or percentages, unless the change is occurring steadily. Change can be seen if a measure starts at 60%, then moves to 65% and 70%. But behavior rarely changes steadily; it varies. It is necessary for teachers not only to take a count each day of classroom performance, but also to display the data in a graph or chart. This way progress can be determined much more easily.

Another crucial concern is developing rules for what is normal progress, what is expected progress. When is enough enough? When is the child making sufficient progress to maintain a particular technique? When is progress slowing down, showing that it is time to change some aspect of the program? We have tried to become more sophisticated in the analysis of progress through the Program Project. Formulating rules to use with collected data is most important in improving our teaching and increasing the efficiency of learning in the student.

Our findings in the area of data collection lead us to believe that at a certain time each day every child should have an opportunity to be probed so we can find out the rate of change or progress he is making. Such a probe need only take a minute of his academic activity. This information about his performance should be recorded, then charted, and then certain standard rules or conventions should be used to analyze the trend of change in the child's performance. The importance of direct, daily measurement is, of course, that it eventually yields an accurate, reliable assessment of child performance and teaching effectiveness.

Assessment

The need for assessment has been another theme found in these pages. There are two very important aspects or types of assessment. First, formative assessment guides the teacher in the selection of instructional materials and all other instructional conditions and events and gives information about how teaching can be improved. Summative assessment determines how effective teaching is over a period of time and takes place at the ends of instructional periods, at times of

when he writes answers to reading questions is demonstrating that he has reached the generalization phase. The final stage of the learning hierarchy is adaptation; a student adapts what he has learned when he can take the principle of the skill and apply it without the need for direction. A child who has learned basic add facts and can figure out by herself how many packages of invitations she needs in order to ask fourteen friends to her birthday party has shown that she has reached the stage of adaptation.

Our most important finding to support the idea of a learning hierarchy is that certain teaching techniques are more appropriate at some levels of the hierarchy than at other levels. Reinforcement is an example of a technique that is inappropriate at some levels. The teacher can reinforce a child with anything -- free time, candy, tokens, etc. -- for improving his rate of responding to multiplication facts. But unless the student is past the stage of acquisition, unless he has the basic knowledge, he will not become proficient. Teaching techniques that are effective in the acquisition stage are demonstration, modeling, and shaping.

In the proficiency stage of the learning hierarchy we have found that drill -- repeating a series of tasks that all have the same components -- and practice -- using the skill to solve problems that may have other components -- are effective teaching techniques. Reinforcement for achieving a better rate is also an appropriate technique at the proficiency level. Some of our findings on effective teaching techniques for the later stages of the learning hierarchy are presented in Chapter 2 and in the curriculum chapters, but further research will be necessary before definite conclusions can be drawn.

Other Implications for Teaching

The learning hierarchy can be used to help a teacher place a child accurately and to choose an effective technique for his place in the hierarchy, but it has further implications for teaching. There is a need for teachers to be aware of the various stages and to attend to each one in helping pupils acquire a new skill. How often do teachers complain that some students forget half of what they have learned after summer vacation? Could it be that these students were not taught beyond the acquisition or proficiency stages? If the maintenance stage was carefully attended to, perhaps this "forgetting" would not occur. Also, since generalization and adaptation are often thought of as the end-products of education, a teacher who can see these stages occurring with even simple skills will feel that his/her students are making real progress.

If teachers are to attend to each level of the learning hierarchy, they will need guidelines for recognizing when each step has been taken. When can a teacher say that a child has acquired a skill? Our Program Project research has shown that rules can be formulated for such decisions. We have found that a combination of percent correct and number of trials makes the best criterion. Basic skills probably need to be learned to a criterion of 100% over two or three consecutive trials.

Other skills may have different criteria. Once the child has acquired the skill, when is he proficient? Again the criterion is a combination of desired rates and number of trials. Chapter 6 presents our findings on setting desired rates. Criteria for the later stages of the learning hierarchy are not yet as well researched, but certainly can be identified.

Our research has other more general implications for teaching. None are entirely new, but in this case they are backed by data. First, teachers should be sure that they are testing what they are teaching. If a teacher is teaching subtraction facts, for his testing to be accurate he should test on those, not on story problems. But teachers should not lose track of long-term goals either. While teaching phonics, the teacher should also take data to be sure that the phonics drills are improving the student's ability to read words. If the teacher is using word lists, he/she should also take data on the student's ability to read in context. In order to keep students progressing toward their goals, it may be necessary for the teacher to abandon set textbooks; but, after all, that is what good creative teaching is all about.

Building on a child's strengths and teaching to his weaknesses will also improve instruction. Students, especially those in any kind of remedial education, need to know that they have strengths. We have found that all students like to be challenged, but they also like to succeed. Students do not need a challenge that will only point up their shortcomings and failures; a challenge, to be meaningful, must be carefully designed by the teacher for the individual student so that he can experience successes.

Our program emphasizes "turning kids on to learning." Unless a child is an active participant in designing his program, setting his goals, and evaluating his progress, learning is not going to be very meaningful for that child. His performance may improve as long as he is receiving some token reinforcement, but when the tokens are phased out, his performance drops. This does not mean that all tokens systems are bad; we do stress that such systems should be used only when necessary and should be carefully planned to include a well monitored shift to more "natural" reinforcers. If the child can be actively involved in the learning process, and can eventually get his reinforcement from the experience of learning, then there is a good chance for long-term change.

We have found that self-management is an important part of the curriculum. Give students practice in making decisions. Let them decide what type of drill to work on today, or which story to read, or how soon a goal should be reached. Remember, children like to succeed, and often they know what is necessary for them to succeed. This technique can help improve a child's self-esteem and attitude toward education.

It is also important to remember that no one technique is the answer. Although similar strategies and programs will work for many students, each pupil is an individual and each program must be tailor-made and changed on the basis of that pupil's performance data.

Implications of the
Applied Behavior Analysis Methodology

Implications in the Classroom

One of the messages we hear whenever we campaign for using any methodology in the classroom that departs from traditional procedures is resistance: the procedures are too time-consuming; they require extra skills from the teacher; they simply add work to a busy schedule. In the face of these statements or arguments -- which are so often made before the procedures have been given a fair trial -- one feels a special obligation to explain why the procedures are important; and why they may in fact be worth any extra time or energy spent in learning how to use them. Inevitably, therefore, our discussions turn to the implications of using these procedures. We have discussed these implications at length throughout this volume; but precisely because they are so important, we would like to reiterate the basic ideas here in this concluding chapter.

When something is going wrong in a classroom, we make certain assumptions about the problems. We assign cause-effect relationships to what is happening. It is very instructive to look closely at some of these "causes" or "explanations" for failure in the classroom.

The class is a bedlam? Well! Disruptive children are responsible for this chaos. A child is having problems learning to read, or has a limited reading vocabulary? Look at his IQ! How can you expect anything else? A child can't follow directions? How could he -- he never listens. What can you expect from a child from that home, those parents?

What's wrong here? Everything: the child is blamed for all of the failures to learn. Nowhere in that catalogue of circular reasoning, faulty analysis, or lopsided examination do we see any reference to the teaching or to the environment for learning that has been established in that classroom.

We believe that if one is going to look for cause-effect relationships, it is helpful to use a divining rod that works reliably. Our point is that the methodology of applied behavior analysis does permit one to make valid and reliable cause-effect judgments. One can examine a problem and, with this methodology, determine quite precisely what is wrong.

The problem may, after all, have its roots in something about the child: maybe the child doesn't listen because he has a hearing problem no one has identified before. (That happens often enough not to be considered an extreme example.) Possibly the "fault" lies somewhere in the teacher's teaching style: perhaps his or her voice is too low or muffled, or the teacher faces the blackboard while demonstrating something on the board. Possibly one can find the "fault" in the noise level in the classroom -- maybe the room is so incredibly noisy that nobody can hear the directions they are supposed to follow. Finally,

the "cause" may simply be poor teaching -- a teacher's procedures may be so rigid or inappropriate that the child is actually hampered in learning. But no matter where the "cause" or "fault" or "condition" is found -- it can be found and fixed.

What is needed is a spirit of inquiry and the procedures that enable one to examine variables critically in order to pinpoint the problems, to describe them, and to develop procedures for remediating them. So far as we know, applied behavior analysis is the only valid way of establishing the relationship between the instructional tactics and arrangements and the effects of these on performance change. If our performance data tell us that a child is not improving in learning a skill -- that is the signal that something must be changed about the teaching. We do not ask the child to make these changes; the burden for change falls exactly where it should -- on those responsible for insuring that learning occurs.

Who benefits? So, then, one can ask who benefits from the classroom applications of behavior analysis? Everyone in the classroom benefits. The benefits to the child are obvious: the methodology permits the child's teacher to understand precisely where the pupil is in his or her learning. The teacher knows how the child is performing in the development of particular skills and in acquisition of knowledge. The teacher knows about the child's learning style and the particular instructional tactics that have worked best with that child. The child therefore has the advantages of instruction individually tailored to meet his or her needs. What could be more beneficial to the pupil?

For the teacher, the benefits are no less striking. Of course, the teacher who is just learning to use these procedures may consider the initial investment of time and energy to be more of a nuisance than a benefit -- but in very short order, that point of view changes. The teacher who uses applied behavior methodology is assured of being able to speak and act with complete authority about what is happening in his or her class. Using a methodology that permits manipulation of variables and a fine-focus view of performance change, the teacher is able to know with almost complete reliability where all of the children are in their learning.

The results of this kind of teacher assurance are almost too numerous to document. But at the very least, teachers can operate with increased efficiency and can plan far more realistically and sensibly than can teachers who must rely on guesswork about their pupils' performance. Increased efficiency also leads to time saved, so that teachers can spend more of their time teaching and not get bogged down in the "bookkeeping" aspects of their work. In a sense, we are talking about being in control of a classroom -- a state that so many teachers find elusive these days. We do not mean that teachers are arrogantly sure of themselves or unquestioning in their approach to their pupils. Rather, we mean that because they have a good data-based picture of where the children are going, how they are getting there, and what needs to be done to foster that progress, the teachers can and do use their time and energies very productively. There is no wasted effort.

Second, teachers who are in this kind of control can speak with authority to others about the procedures used, about the children's progress, and about classroom management generally. For instance, the teacher who can show a parent data-based information about a pupil's work -- who can document all phases of the child's performance, including such elusive variables as learning style -- can usually attract parents' support and cooperation very readily. That sort of presentation is, to parents, so much more appealing than a vague discussion of their child's progress; the parents understand that the teacher has taken the trouble to learn about their child's individual characteristics.

Other teachers, counselors, consultants, and administrators also stand to gain from such discussions with teachers about the procedures and the results of applied behavior analysis. Teachers can share data, information about successfully realized procedures, and programs and sequences they themselves have developed; these have significant value because they are data-based. There can be an enormous educational ripple effect when even one teacher has this kind of information to share -- information about workable procedures developed in the classroom.

Which brings us to our final remarks about implications for the teacher. Teachers who use applied behavior methodology are researchers. They manipulate variables and they can evaluate the effects of specific instructional tactics and reinforcement systems on each child's performance. In a very real sense, teachers make critical contributions by bringing research out of the remote laboratory or ivory tower and into the classroom, which is exactly where it belongs. This is applied research -- applied where it is needed.

Having said all this about benefits, we need to ask a question that has a rather disturbing answer: how prevalent are these procedures in school settings? They are not at all prevalent. We think this is altogether regrettable, particularly because the procedures lead to the kind of accountability that citizens have been demanding of our schools for some time. Educators who have the data to tell them what is happening in a classroom can take responsibility for making that classroom as productive as possible. They do not need to look for "causes" of children's problems or failures outside the classroom -- rather, they can identify and solve the problems right there. With procedures that assure the teacher of precision, accuracy, and reliability in his or her work, there are no surprises -- or at least no unpleasant ones. The work of the Program Project has been to increase the precision, accuracy, and reliability of classroom teaching.

Implications for Administrators

If citizens expect their children's teachers to be accountable, we can multiply that demand many times over in considering what they expect from administrators. Anyone who has ever listened to a school official defend a budget or program before a citizen's group or legislature knows what tremendous pressure administrators feel in these days of tight funding and competing priorities.

But administrators not only need to defend programs; they need to evaluate them. We spend a considerable amount of money on inservice. Is it doing any good? We have not really taken the necessary measurements to answer that question. Administrators have not comprehensively measured the effectiveness of inservice on their present personnel. They do not really evaluate whether the money expended has "bought" increased competencies. Further, administrators continue to hire many new teachers who are really still learning how to teach.

Legislators and parents want to know whether children are learning to read, to do math, to acquire basic skills. The procedures of applied behavior analysis can help everyone to be more accountable. Daily measures and other procedures can provide administrators with good solid information to verify that teachers are teaching these skills; that they are making modifications in programs which will help them to do the job better; and that children are making progress. We need to reiterate: this information is qualitatively and quantitatively better than the standardized tests we depend on now, tests which measure infrequently, and so often measure behaviors which are not relevant to what has been going on in the classroom. Standardized tests are not good predictors.

Armed with accurate information about what is happening in the classroom, the administrator can make a more realistic case for his or her programs in the continuing search for funding. The administrator can also evaluate personnel in his or her charge when there is this accurate information about child performance. The question "Are teachers teaching?" can be answered by looking at whether or not children are learning. The reverse is also the case.

Additionally, the administrator can use this information -- pupil and teacher performance information -- to assess needs, to identify program gaps, and to plan future programs. He or she can "spread the word" -- if a program is working well and producing results that are desirable, the administrator can increase everyone's awareness of this program. By the same token, the administrator can become acquainted with good programs in other administrators' bailiwicks. With a means for evaluating programs through the procedures of applied behavior analysis, the administrator is able to cover a very wide range. Moreover, these analytical techniques and data collection methodology enable the administrator to evaluate more critically his or her own administrative capabilities and then to improve them.

Finally, administrators who have pupil and staff performance information at hand have something to communicate, and we believe that increased communication from and among administrators is beneficial for everyone connected with education. Communication between schools, with school boards, with parents, with the public -- informed communication can only increase the public's support of the schools and the administration. It can only reduce much of the criticism that has been leveled at the schools -- all too often justifiably. Let us look at one example of the benefits of increased communication from our work at the Experimental Education Unit to illustrate this point.

One of the crucial uses of objective information is to report child progress to parents. Administrators have special responsibilities in conveying such information to parents -- and how they convey the information will determine parents' response to the school. Parents can be tremendous supporters of the administration and the schools if we build their support by providing more objective and reliable reporting of the progress their children are making.

We have found that as we share our information with parents, they not only understand it but they begin to look at daily data themselves in critical ways. When it comes to support, I think we have some of the best support possible because of our data-based reporting: our parents know what programs their children receive, they know their children's performance is being evaluated on a daily basis, they know that changes are being made continuously to encourage performance, and they can see visually through charting procedures what progress their child has made since the last reporting period. That has been of great benefit in communicating with parents and helping them to understand their child's strengths and weaknesses. We've also been able to get parents to use daily data types of programs in the home to conduct the same programs. So not only have we shown the parents what progress the child has made, we've helped parents to acquire skills that they can use in the home to improve their relationships with their children and to help their children become more self-managing in the home.

Conclusion

If it were possible to summarize almost a decade's research in a single statement, we could say this about the Program Project: The critical issue in our research has been the investigation of ways to improve instruction. The project's several teams approached the basic question from slightly varied points of view, with differing emphases. But the research questions they asked and the issues they addressed related to the central, crucial topic. Their standard operating procedure was to identify the major components of instruction, and -- through increasingly refined and precise analyses -- examine their influences on children's learning. When these varying influences were better understood, it was possible to make valid and reliable statements about improving instruction.

In Chapter One of this report, we said that "...no matter how often, how much, or how carefully we review research findings, we are still confronted with certain key issues in any teaching/training situation." That was both a prospective and a retrospective statement: a comment on earlier research and what it told us about our own research needs, and a reflection of our own findings. We believe we have made some exceedingly important and validated statements about instruction and learning; these statements emerge from such a wealth of data that their importance could be masked by the volume of detail alone. It seems appropriate, then, to end this report with a very brief reiteration of those identified, basic components of instruction that do surface again and again; they may begin to seem like old friends to the

reader rather than new or novel findings, but their importance is undeniable to us.

First, the teacher's instructional plan. How well the teacher has used planning time -- that is, the care and precision he or she brings to the plan, the individualization of instruction -- all lead to increased precision in our information about children's skills, and this in turn leads to increased efficiency and effectiveness of the instruction.

Second, the need for assessment. By this we mean careful, individual assessment. Initial assessment that gives an accurate picture of the child's entering capabilities -- against which to measure his or her progress through the planned instructional sequences; and then ongoing assessment that gives us a continuous and accurate portrait of the child's specific progress. Assessment must involve direct and repeated measures of the specific tasks to be taught. It doesn't help the child or the teacher to have an irrelevant measure; we need to know how the child is doing -- and what he or she is capable of doing -- on the materials at hand.

Third, the importance of drill and practice. These are valuable instructional procedures -- when carefully arranged and designed, they are the heart of competent instruction. Drill and practice on new and missed words, number problems, concepts: the finding that they are crucial may not surprise competent teachers; what may interest these teachers is our validation of the procedures under various instructional conditions, and restatement of the issue. We have been able to examine many of the parameters of these procedures, and our findings should make a difference in the way teachers approach instructional tasks.

Fourth, the hierarchy of learning. The fact that learning occurs in phases -- and that each phase has identifiable behaviors -- has a significant effect on instructional practices. To give merely two examples: during the acquisition stage of learning, teachers must be critically aware of how they arrange the antecedent instructional events. But when the learner has moved from the acquisition stage and is now able to build proficiency, teachers must pay more attention to arranging, and re-arranging the subsequent, or reinforcing events of instruction. The teacher who wants to increase a pupil's proficiency at this point will find it fruitful to examine the reinforcement components of the instructional plan.

Finally, the dynamics of instruction and learning. Anyone interested in improving instruction will have to be concerned with child progress -- how else can one evaluate the quality of instruction? -- and with continued measurement of progress. The crux of it all is that the educator must analyze progress trends and use this information dynamically in making instructional decisions.

PART II

PART II

RESEARCH AND APPLICATION OF A PROTOTYPIC MODEL FOR DEVELOPING INSTRUCTIONAL MATERIALS FOR HANDICAPPED CHILDREN

Introduction

Exceptional children frequently have difficulty acquiring basic life skills. Thus, the learning process often proves to be frustrating for many of these children, as well as for their teachers. Regardless of the difficulty, however, it is important that these children master many varied skills so that as adults they can lead more independent lives. It is apparent to educators that there is a relationship between the number of basic life skills which an individual possesses and his ability to function in society. For example, to hold a job successfully one must be able to arrive at the job site on time, perform the work required, prepare or purchase lunch, cooperate with peers, and return home. Success may also depend on the ability to drive a car or read bus schedules, tell time, handle money (deposit pay checks, budget expenditures and purchase items), and recognize survival words such as stop, poison, and danger. Many skills are necessary to complete this chain.

Typically, teachers of normal or gifted youngsters do not have to teach their students how to put on their coats or tie their shoes. These children come to school already possessing such basic abilities. Similarly, normal children often learn to tell time and make change without direct instruction. Those youngsters who do not learn by observing the actions of others, however, need to be systematically taught many of these skills. Since there are numerous life skills which children must master, it is vital that educational materials be effective and time set aside for instruction be used efficiently. Research has investigated a number of antecedent and subsequent events which influence teaching (Smith, 1973). The effects of instructions (Lovitt & Curtiss, 1968; Lovitt & Smith, 1972), feedback (Hillman, 1970; Kirby & Shields, 1972), and reinforcement contingencies (Chadwick & Day, 1971; Smith, Lovitt & Kidder, 1972) have been the topic of much research and have influenced various types of instructional procedures. If, however, the actual material presented to the learner is inconsistent or poorly sequenced, learning will be impeded. Unfortunately, at this time effective curriculum materials for most of the basic educational and life skills needed by special education students are not commercially available. As a result, classroom teachers are left to select, sequence, and plan lessons to teach self-help and life skills to these students.

The primary focus of Team III's research was the creation, refinement and verification of a model for curriculum development. This prototypic model for developing instructional programs and materials provides the educator with a detailed set of procedures to follow in developing instructional sequences which are nearly error free and which

teach new skills in a minimum amount of time. The programs resulting from this process are highly structured and pertain to specific skills.

The Prototypic Model

This prototypic model for instructional materials development was initially conceived under the auspices of the Program Project Grant. During the first two granting years, it was partially tested and refined. Continued research efforts were conducted during this final year of the grant (1974-1975) to test the efficacy of the final steps of the model.

Considerable refinement of the prototypic model has occurred over the past three years. Details are now available in both a graphic (lattice: Figure 1) and descriptive format.

Insert Figure 1 about here

To clarify the procedures outlined in the prototypic model, one instructional program developed through this process was selected as an example for the following description of the model -- the Shoe Tie Program (Smith, Smith & Haring, 1974).

Prerequisite Knowledge

New skills are developed and mastered by building on those skills already mastered -- that is, the prerequisite skills. The educational programmer must come to the task with three mastered entry skills. He must be thoroughly familiar with the skill to be programmed. If he wishes to create an instructional program to teach youngsters how to tie shoes, the instructional programmer must be proficient in the skill of shoe tying.

Besides knowing how to perform the target skill, the programmer should be competent in basic programming techniques such as cueing, fading, and chaining (see Skinner, 1968). He must be able to create instructional frames which break the task into steps that are small enough to be mastered, yet still retain the interest of the learner.

In addition to these two general skills, the instructional programmer must be aware of general human learning characteristics. For example, he must be able to build into his sequences enough repetition to allow for overlearning. He should know how to include demonstration sessions to provide modeling, and review sessions to insure that mastered skills are maintained at a proficient level of performance.

Primary Decisions

When the educational programmer is certain that he possesses the entry behaviors necessary to approach the task of creating educational sequences, he is ready to begin the process of developing a skill-specific instructional sequence. First, the skill to be programmed must be clearly and precisely identified. In our example, shoe tying is that specific skill and the terminal objective of the proposed sequence. In this sequence only shoe tying is taught; the sequence does not include instruction on putting on or lacing shoes.

The second decision which must be made at this point concerns the intended audience or target population for whom the program is to be written. The instructional programmer will have to recognize specific deficits which may occur in his target population. The Shoe Tie Program was designed for any individual who can pinch, pull against tension, and imitate or model the actions of others.

Lattice Developed

Once the target skill and population have been precisely defined, a task analysis process begins. The lattice system developed by Woolman (1962) was modified to implement this step of building the prototype model. As the lattice component of the model seems particularly applicable to the classroom teacher's daily needs, it will be discussed in greater detail here.

The lattice is a graphic display of the analysis of a specific task. Goals and objectives are put into a hierarchy so educational activities can be planned to help students master various skills systematically.

It is important for teachers of handicapped youngsters to carefully specify which behaviors their students need to acquire; for successful learning, goals must be precisely stated. But identifying a task to be mastered is only the first step in developing an educational sequence. Often, subgoals of tasks need to be specified. These subgoals can also be broken down into smaller objectives. By carefully sequencing these objectives, subgoals and major goals, the educator can plan relevant educational activities that permit the learner to master specific objectives along the way toward his mastery of the target skill.

The lattice system is one way to organize educational activities and to sequence skills. The lattice forces the teacher to specify goals and objectives: once a lattice is constructed, the sequence of events leading to the completion of a task is clearly delineated because the integral parts of that task are specified and put into a hierarchy.

The lattice is not an instructional sequence, nor does it outline precise activities to be included in the instructional program. The lattice merely displays the component parts of a skill arranged according to the sequence of behaviors leading to the completion of a specific task. Myron Woolman originated the lattice system to give structure to

the ordering of educational activities. He argued that by latticing a task before instruction begins, a teacher could see the relationship and integration of concepts to be taught. Woolman (1962) expressed the intent of his lattice system:

... any body of material to be learned can be organized into a sequence which permits the systematic growth of a pool of relevant responses to the stimulus being learned. ... as learning progresses, the learner is alternately required to add new information and integrate it into the ever growing pool. This continues until the learning objective is achieved /p. 1811.

Since Woolman initially proposed the lattice system, others have adopted his procedures. Budde and Menolascino (1971) showed how the lattice system can be applied to vocational habilitation. Bricker (1972) used a lattice format to display his sequence for language acquisition. Smith and Smith (1974) employed the lattice system to analyze instructional sequences before they developed structured instructional programs to teach self-help and life skills.

Lattices can be very sophisticated or very simple. They can be constructed to show the relationship of one skill to another. They can be three-dimensional to illustrate the difficulty as well as the sequence of component tasks. However, such complex systems are often confusing. For purposes of organizing educational activities or analyzing instructional skills, complexity is usually not necessary.

For most teachers' purposes, lattices should simply display the analysis of a task. Simplified lattices allow for ease of communication among teachers who use this system for task analysis and for speed of construction. To meet the many educational needs of their students, teachers need to be able to analyze specific skills as quickly as possible. The following section describes the procedures teachers can use to construct lattices to display their analysis of specific skills.

Lattice construction. Since a lattice is a graphic display of a skill analysis, there are specific procedures which must be followed in its construction. Since sequence of events is involved in constructing a lattice, we will use a lattice to display this sequence.

Insert Figure 2 about here

In addition to the graphic display, narration is included to explain what the boxes mean and why they were placed on the lattice in their respective positions. Sections of the complete lattice are numbered so the reader can match the narration with appropriate sections of graphic display.

1. Prerequisite knowledge. Just as children need to possess specific skills before they can perform complex tasks correctly, so too must adults possess certain skills before they can break down a task for analysis and display that analysis in lattice format. Before a teacher breaks a skill into component parts and attempts to construct a lattice, he should know what a modified lattice is and how it is used. The sections included in this part of the lattice summarize the knowledge a teacher should possess before attempting to "lattice" a skill.

Insert Figure 3 about here

1a. Lattice system. Because the purpose of constructing a lattice is to obtain a sequenced list of the major component parts (enroute objectives and subgoals) of the skill to be taught some rules and conventions are followed in constructing a lattice. After the teacher analyzes the skill and puts the analysis in lattice format, he will refer to the lattice as he develops the instructional sequences designed to help his students attain mastery of the desired behavior. Therefore, the format used should be consistent so that interpretation of the analysis is identical to the sequence originally intended. Moreover, following a prescribed format for lattice construction promotes ease of communication. If other teachers analyze skills in the same manner, lattices can be shared with colleagues so that skill analysis and sequencing need not be done over and over again. Specific details about latticing rules are found under the heading numbered 4: Graphic Representation.

1b. Subject matter. Prerequisite knowledge of subject matter is more important than knowing the rules and conventions for lattice construction. The teacher should have a thorough knowledge of the subject matter to be analyzed since it is impossible to break down an academic task or skill if one cannot successfully complete the task oneself. For example, the teacher who needs to teach his students how to tie shoes can not divide that skill into component parts without knowing how to tie his shoes systematically.

2. Task analysis. Once the teacher is familiar with the procedures used to construct a lattice and is competent at performing the task to be analyzed, he is ready to begin the task analysis.

Insert Figure 4 about here

2a. Identify the skill. The teacher must first determine precisely what specific task he wants to submit to analysis. If a child needs to

learn how to tie his shoes, then shoe tying is the specific task to be analyzed--not the more general skill of selecting appropriate shoes for certain occasions, for example. Further, although the learner might also be deficient in putting shoes on his feet, that is a different task and should not be included in the lattice for shoe tying.

2b. Determine entry behaviors. After the task to be analyzed is identified, the teacher should decide what skills he will expect of students beginning the sequence--that is, at what skill level he will begin instruction. For example, if the teacher wishes to teach his students how to tie shoes and he plans to lattice that skill, he needs to decide what skills he will and will not teach in his instructional sequence. Fine motor coordination is an important prerequisite skill. The teacher must decide whether he will expect competence in motor coordination before he teaches shoe tying or whether he will teach that skill simultaneously with shoe tying.

Our experience indicates that more efficient instruction occurs if prerequisite skills are mastered before students begin a specific sequence such as shoe tying. Often entry behaviors are determined arbitrarily: different teachers expect different entry levels from their students. Nevertheless, some entry levels should be specified.

2c. Analyze skill. Although not a sophisticated or scientific method, one way to analyze a skill is to observe its execution repeatedly. As the teacher performs the task and observes others execute the skill over and over, the major component parts of the skill can be identified, and the sequence in which they are performed becomes obvious. As the teacher repeats the task, he should carefully scrutinize his actions and identify each step. When we analyze a skill, each part of the skill is written on an index card so that the sequence of these components can be easily ordered and reordered.

2d. Sequence. Once identified, the component parts of the skill are sequenced. Frequently, the sequence is dictated by the skill and the end product: for example, in shoe tying, the sequence and the product are constant.

A hierarchy of skills is identified during sequencing. Some parts of the skill are major components; others are subordinate steps which lead to completing the major steps. In shoe tying, completing the half-knot and tying the bow are two major components. These, then, are the subgoals of the final goal for a student mastering the skill of shoe tying. The enroute objectives which lead to completing these two subgoals are placed under the subgoals, thereby representing the hierarchy of steps in the task.

All of these steps (identifying the skill, determining the entry behaviors, analyzing the skill and eventually sequencing the steps used to complete the task) comprise the major elements of the task analysis.

3. Cell components. Lattices are comprised of a series of interlocking boxes or cells. Each of these cells must be placed in position

according to the sequence and analysis determined in the preceding step of this process. The terminal behavior, or goal, the subgoals, and the enroute objectives have been stated concisely and marked for the graphic representation. The next step in lattice development can now be completed.

Insert Figure 5 about here

3a(1). Enroute objectives. Enroute objectives are those behaviors which lead to completing the subgoals. If tying the half-knot is a subgoal of the shoe tying sequence, steps such as bringing the shoe laces into a crossed position are the enroute objectives. These are placed underneath the subgoals.

3a(2). Ridgeline. The lattice ridgeline comprises the subgoals of a task. When the lattice is formed, these subgoals are connected to each step in a step ladder format which leads up to the terminal behavior.

3b. Terminal goal. There is one terminal behavior or goal for each lattice. Depending on the complexity of the lattice, the terminal goal could be as simple and concrete as "shoes tied" or as complex and conceptual as "time concepts." Regardless of the nature of the skill analyzed, there is only one concisely stated, terminal goal for each lattice. All the previously identified steps lead directly to completing the terminal behavior.

4. a. Graphic representation. For a lattice to be consistently interpreted by many people and to be meaningful to the person who constructed it, certain rules or conventions should be followed. The lattice is a blueprint or master plan depicting the steps and the sequence which lead the learner to mastering a specific task; the graphic display should be clear and easily interpreted.

Insert Figure 6 about here

4.b. Rules. Rules for promoting clarity and ease of interpretation follow: those for cell placement are in this section followed by rules for placing the lines connecting cells.

A step ladder format is used for arranging the subgoals' sequence. Cell boxes display this sequence from left to right. The ridgeline is connected by lines which form right angles.

Insert Figure 7 about here

Whenever possible, enroute objectives are connected to each subgoal's cell with straight lines. When it is necessary to show three or more enroute objectives not primarily related to each other, these may be placed under the subgoal cell with both straight and bent lines.

Insert Figure 8 about here

If one enroute objective must be completed before another task is initiated, the cells are put together in a chain. When one task is definitely prerequisite to the next, the first objective in the chain is put in the bottom cell. All of the ensuing enroute objectives lead up to the subgoal.

Insert Figure 9 about here

Major subgoals may be considered terminal goals of "mini-programs" within one complete lattice. In some cases, it is desirable to have an overall lattice showing how skills relate to each other in order to plan curricula. This can also be accomplished by using the lattice system. In the example shown below, two small lattices are put together under one terminal behavior. This format can easily be adapted for the purpose of displaying the progression of skills taught in one academic year for particular skill areas such as computational arithmetic or self-help.

Insert Figure 10 about here

4a. Entry behaviors. The behaviors or skills which the learner must possess before he begins the instructional sequence developed from the lattice are entry behaviors. Entry behaviors do not appear as cell components, but are listed on the lattice page. A convenient place for them is the upper left hand corner. They are noted and labeled as entry behaviors, and are stated concisely.

4b. First enroute objective. This objective leads the learner to mastering the subgoals which, in turn, lead to his achieving the terminal goal. If the sequence of these objectives is a simple linear progression, the first enroute objective is placed at the bottom of the chain. However, if several objectives or a set of objectives are included under one subgoal, the goal which is mastered first is placed to the left of the other enroute objectives.

4c. (1). First subgoal. The first subgoal in the sequence, the first ridgeline cell, is placed towards the bottom, left hand corner of the page. The enroute objectives related to completing that subgoal are positioned underneath this first ridgeline box.

4c. (2) Subgoals. The remaining subgoals are positioned in step ladder format (from left to right) leading to the terminal behavior. These comprise the ridgeline.

4d. Terminal goal. The terminal goal always appears in the upper right hand corner. Stated concisely, it is positioned to indicate clearly that it is the end-goal of the sequence.

5. Lattice developed. This is the terminal goal of the task described in this report. Before a lattice is truly completed, however, some final testing and evaluation must be undertaken.

Insert Figure 11 about here

5a. Testing. The teacher should perform the latticed task once again, following the lattice as it is now constructed. He should scrutinize each component to be certain that the words in each cell adequately describe the behavior. He should recheck the sequence for accuracy.

5b. Evaluating. The teacher should note any evidence he finds that the lattice does not display the sequence or the analysis properly or that wording is misleading.

5c. Modifying. If errors in the lattice have been identified, they must be corrected. If entry behaviors were omitted, they must be included. If the ordering of the subgoals was incorrect, it must be adjusted. After these final checks, the task has been analyzed and displayed so that instructional activities can be organized. These activities should aim for enabling the learner to master each enroute objective and its subgoals, and eventually, the terminal behavior.

The lattice approach could be helpful to teachers as they plan their curriculum activities for a year, a month, or a week. The system allows teachers to specify which skills they want their students to master, and to display the analysis of each skill in a simple format so that enroute objectives can be identified easily.

The teacher then has an outline from which to plan activities that will help his students acquire needed skills. Further, the outline can identify or pinpoint those skill areas for which effective programs are not currently available, thereby guiding the teacher's own plans for program development. Similarly, for the programmer who implements the prototypic model in its entirety, the lattice serves as a blueprint from which the instructional program is later built.

Insert Figure 12 about here

Pretest Package

Once the lattice has been constructed, it plays an integral part in the next stage of the program -- developing a pretest. Test items are constructed to sample students' abilities to perform the tasks identified in the lattice. The pretest serves three purposes. First, it indicates whether the learner has already mastered the task and therefore, does not need to enter the instructional sequence. Second, the pretest samples the entry behaviors to determine whether the learner is ready to enter the sequence at Lesson 1. Third, the pretest offers information regarding differential placement in the program. For example, if the learner has not mastered the task, but can successfully complete some components of the skill, the learner's exact beginning level should be specified. Once the program is fully developed, not all children will begin with the same lesson. Students who initially possess some of the behaviors required to perform a task successfully, but who cannot accurately complete the terminal behavior, can be placed in the sequence according to their initial skill level.

Test items are constructed for each component of the skill; items are included from each part of the ridgeline and from many enroute boxes. Materials needed for the pretest are developed and a data collection system is prepared. For an accurate indication of each learner's skill levels, pretests are individually administered. Because the pretest is a critical part of the entire program package, fieldtesting is required to determine whether the pretest accurately identifies varying skill levels.

Program Format

The next program decision relates to format. One option might be a series of worksheets which do not require teacher assistance. In this case, a teacherless program would emerge. Another option might consist of structured lessons administered by teachers or paraprofessionals. This procedure produces either small group or one-to-one programs. The Shoe Tie Program was developed for one-to-one teaching. Since this is an expensive educational procedure, the instructional sequence was designed for administration by untrained as well as trained personnel.

Initial Fieldtest Population

The first group of learners to receive the instructional sequence is selected through use of the pretest instrument. Those pupils having all of the entry behaviors, but not possessing skills beyond those taught in the first lesson are selected. Learners possessing advanced skills could enter the sequence, however, those having only the entry behaviors are used for this first fieldtest in order to verify each lesson.

Initial Fieldtest

Phase 1. In this first phase, the program writer writes lessons concurrently with fieldtesting. General criterion levels are established for all of the lessons. In the Shoe Tie Program, the authors decided that no more than 10% error would be accepted for each lesson. Therefore, they re-wrote any lesson in which any child failed to meet the criterion of 90% correct responding. A general data collection system was also devised. Data were collected for each frame for each lesson, allowing the programmers to determine when specific frames produced high error rates. When these were identified, the frames were corrected and retested. Rewriting continued until most error was eliminated.

The programmers also developed a format to facilitate lesson writing. Since these instructional programs are highly structured and are intended for administration by personnel with widely varying skills (e.g. parents, volunteers, and classroom aides), a 3-column format was developed for ease in administering the lessons. All of the teacher's directions are found in one column. Those actions used to model the desired behaviors are carefully described. Words spoken to the student are printed in capital letters. All of the expected student responses are found in the second column, indicating whether the student is required to answer a question, imitate a behavior, or manipulate supplemental materials. The third column contains suggested remediation activities. In some cases, all possible error cannot be eliminated by rewriting the program. Whenever a problematic instructional frame occurs, an elaboration of the teacher's directions appears in this column. A sample lesson format is included (Figure 13).

Insert Figure 13 about here

The first lesson of the program is written once a convenient lesson format has been designed. Inexpensive teaching aids are developed where necessary. The only teaching aid developed for the Shoe Tie Program was a simple device used to teach pinching and pulling a shoelace. The tasks taught in this lesson aim to bring the student to mastery of the first enroute objective of the first component specified in the lattice. Each lesson should bring the learner one step closer to mastering the terminal behavior. Even though more than one lesson may be required to

teach one enroute behavior, the aim is still to move the learner progressively closer to the target behavior. After the first lesson is written, it is tested on one or two subjects. If error in excess of criterion occurs, the lesson is rewritten and retested. The second lesson is then written and fieldtested. Once again, if error exceeds the criterion rate, the lesson is rewritten and retested. These procedures are repeated until all of the lessons have been written and fieldtested on a small population of students.

Phase 2. When the second phase of initial fieldtesting begins, the entire sequence has been developed, but the whole program has not been tested because of the considerable rewriting that may have occurred in the first phase. Therefore, the whole program is now submitted to fieldtesting, administered by one or two of the program writers' colleagues. Feedback from these administrators enables the programmer to clarify any teacher directions which prove to be ambiguous or incomplete.

Six children at the Experimental Education Unit were selected for this second phase of initial fieldtesting of the Shoe Tie Program. Four of the six students chosen for the second phase were enrolled in the Down's Syndrome Kindergarten. These children possessed only the entry behaviors specified in the pretest and lattice, and were not differentially placed in the program at advanced levels. The fifth student was an eight year old moderately retarded boy, and the sixth student was an eighteen year old emotionally disturbed young man. The entire sequence was tested to insure that most error had been eliminated in the previous stage.

One of the kindergarten students successfully completed the entire Shoe Tie Program in 21 sessions. After 44 sessions, another five year old student completed all but the last lesson. The other two Kindergarten students failed to complete the program due to absenteeism and/or uncooperative behavior. The eight year old completed the entire lesson sequence in 11 sessions, and the 18 year old learned to tie his shoes in 7 sessions. These fieldtest data indicated that the sequence enabled the children to master the terminal behavior with a minimum amount of error; hence the program was ready for secondary fieldtesting. If substantial error had occurred during this phase of initial fieldtesting, the program would have been rewritten and retested, as was the case with several other programs.

Secondary Fieldtesting

Once the instructional program is written, fieldtested with a limited number of subjects, and rewritten, the sequence is ready for more extensive fieldtesting. Multiple packages of the instructional program are produced. The teachers' manuals are edited, typed, duplicated (at least 50 copies), and bound. If supplemental materials such as teaching aids and student workbooks are used in the program, they must also be produced in sufficient quantity for the secondary fieldtest population. Teaching aids should be durable and reusable, with the exception of student workbooks.

Additional fieldtesting is required for several reasons. First, it is important for more children to be included in the fieldtest population. This number need not exceed 50 youngsters, but should be more than the 5 to 10 students who participated in the initial fieldtest stage. Additional students are needed to validate the instructional sequence and to determine whether error pileup occurred because of unclear instructional frames.

Second, wider fieldtesting yields information about teacher-induced error. In the initial stage of fieldtesting, the instructional programmer and those familiar with his procedures tested the program. Because of the "in-house" nature of initial fieldtesting, elements of the directions may have been omitted or written unclearly. Instructional programmers frequently use jargon familiar only to themselves and their colleagues. This jargon could mislead or confuse the classroom teacher and could result in new student error.

Before an instructional program is ready for full-scale dissemination, those parts of the lesson sequence which caused teacher error should be isolated; this is accomplished by analyzing feedback from teachers using the program. First, data gathered in the secondary fieldtest stage should be analyzed. If numerous errors occurred in sections which were error free in the initial fieldtesting, it is probable that teachers did not understand the directions. In some cases error pileup occurs for one teacher and not for another. This kind of inconsistency will appear in children's data, indicating ambiguity in teacher directions.

Often, however, student data fail to indicate ambiguity which does in fact exist. For instance, a teacher may not understand the directions in one section, but if he teaches the section appropriately, the student data will not indicate a need for rewriting. For that reason, it is important to collect the second kind of feedback: information from those using the program. Through direct communication, ambiguities can be identified for the instructional programmer. Whenever ambiguity or error occurs, the instructional programmer has an obligation to rewrite affected sections.

For the Shoe Tie Program, 24 special education teachers were contacted and 18 indicated a willingness to use the program with 32 of their students. All of these students had learning problems ranging from severe retardation to moderate developmental lags with considerable behavioral disorders. The students were well past the age when shoe tying is expected to occur and had experienced numerous failures in attempting to learn basic self-help skills. One teacher's comment, "If this child, who has very low academic abilities, can successfully complete this program, I feel almost anyone would be successful," typifies this population. After 45 instructional days, 12 teachers reported data on 25 students. Of those 25 students, 12 successfully completed the program (Table 1).

Insert Table 1 about here

The range of instructional days needed to meet criterion was 10 to 36 with a median of 19 days. Three additional students (two who did not have laced shoes and one confined to a wheelchair) completed Lesson 9 which required that they be able to tie the model shoe. Thus, 15 of 25 students successfully learned to tie shoes. The remaining 10 students experienced various problems with the program. One student's visual acuity problems impaired his performance and he was removed from the program until appropriate corrective lenses could be provided. Three other students (the poorest performers) had excessive behavioral problems and could not be controlled by their teachers. One child made no progress after Lesson 4, and several others were frequently absent.

Each frame of the program was analyzed to determine if rewriting was necessary. "Pushes lace through hole," objectives 14 and 18, were the only obvious problem areas in the program (Table 2).

Insert Table 2 about here

Setting a reasonable criterion of three days per lesson, these two objective checks in Lessons 5 and 6 appeared to be problematic. By Lesson 7, this same objective (22, "pushes lace through hole") no longer had a high error rate. The final Shoe Tie Program contained a warning to teachers that this skill appears to be the most difficult to learn. The teachers were encouraged to give their students extra practice on this skill and to use tangible reinforcers if they are deemed necessary.

From the follow-up questionnaire sent to all participating teachers, the only suggestion consistent across the majority of teachers dealt with the use of verbal instructions to the students. The revised program encouraged the teachers to alter the verbal directions at their discretion.

Final Fieldtesting

During the last phase of instructional material development, enough program packages are produced to conduct final fieldtesting with another 30 to 50 students. The procedures used in secondary fieldtesting are repeated in order to validate the entire program including all of the revisions. Each fieldtesting stage has had a slightly more sophisticated purpose. The initial stage tested the first draft of the program with emphasis on student error. The secondary fieldtest stage specifically monitored both student and teacher error. After these steps have been completed, the instructional program is ready for dissemination. Final fieldtesting insures that revisions made after the secondary fieldtest stage actually reduced student and teacher error.

After a maximum of 25 instructional days, 9 administrators reported data on 25 pupils in the Shoe Tie Program. Of these 25 pupils, 9 successfully completed the program (Table 3). The range of instructional

days needed to complete the program was 3 to 15, with a median of 8 days. Two (2) additional children completed lesson 9 which requires that they be able to tie the model shoe. Thus, 11 out of 25 students successfully learned to tie shoes. Two (2) other students left school before completing the program, two (2) were still working on the program when school ended for the year, and two (2) failed to pretest for the program (Table 4). The remaining 8 students were reported to have lost interest in learning to tie their shoes.

Insert Table 3 about here

Insert Table 4 about here

Each frame of the program was analyzed to determine if rewriting was necessary. Setting a criterion of more than three days per lesson as an indication of problem frames, criterion steps 11 (holds first loop in place with assistance) and 12 (pulls loop away from hole) were the only objectives which appear to have caused problems. Five (5) pupils required more than 3 days to acquire these two skills. Interestingly, objectives 14 and 18, which caused substantial student error during secondary fieldtesting, did not cause excessive errors during final fieldtesting. When the data from both secondary and final fieldtesting are combined (Tables 2 and 4), there do not appear to be any problem lessons.

The data from the follow-up questionnaires received from participating Shoe Tie final fieldtest administrators indicate that the teachers felt very comfortable with the added freedom as the their use of the verbal directions in the manual. Additionally, the administrators expressed general satisfaction with the program and a desire to continue to use the program with other children.

Two general comments about this fieldtest are appropriate. First, what many administrators called behavior problems or uncooperative behavior by their students in the program was the most consistent reason for pupils not successfully completing the program. The pretest does not measure this aspect of pupil readiness and the materials do not provide the teacher with special means to motivate or control non-compliant pupils. As with all instructional techniques, the teacher still maintains primary responsibility for instructing pupil compliance. Second, the materials appear to be well sequenced and very appropriate for a wide range of pupils. For individuals who possess the entry skills, the Shoe Tie Program is an efficient method for teaching the skill of shoe tying.

Instructional Program Developed

To summarize, the specific skill taught by the instructional sequence was carefully selected and analyzed in such a way that each step in acquiring the skill was precisely identified and sequenced. The lessons were written so students could master each step, and the emerging program was fieldtested at least three times. There are various ways to disseminate these programs, including federally sponsored clearinghouses and commercial publishers. The instructional programmer needs to determine the most appropriate vehicle to disseminate the fully developed instructional program, one that has been through all the stages noted above.

Status in September 1973

During the first year of this project (1972-1973) the lattice system was refined and several instructional programs were written and developed through the first stages of initial fieldtesting at the Experimental Education Unit (EEU). By September 1973, four programs had entered the final stages of initial fieldtesting: (1) Shoe Tying, (2) Measuring (Ruler), (3) Time Telling, (4) Make Change: (a) Coin Discrimination, (b) Bill Discrimination, and (c) Money Values. In addition, one program (Alphabetizing) had been written and was ready for initial fieldtesting.

Considerations of limited time and resources necessitated a reprioritization and revision of the original Scope of Work projected for Team III's second-year of research 1973-1974. The final objectives selected for that year were as follows:

- I. Continue research on the methodology of creating instructional programs (i.e., development of the prototypic model).
 - A. The latticing technique
 - B. Dissemination of research on refinement of the prototypic model
- II. Continue refinement of prototypic model procedures through actual program development.
 - A. Reach the secondary fieldtest stage:
 1. Shoe Tying
 2. Measuring (Ruler)
 3. Make Change:
 - a) Coin Discrimination
 - b) Bill Discrimination
 - c) Money Values
 - B. Complete initial fieldtesting and material preparation:
Time Telling

C. Reach the writing stage for new programs:

1. One program in the area of primary level life skills
2. One extension of an existing program

During the second year of research, fieldtest data generally supported the efficacy of the prototypic model. (Specific data will be presented in the discussion of individual programs.) However, as problems arose, some revisions were made in the model. These revisions primarily reflected pragmatic concerns relating to the actual procedures employed (e.g., pretest format, data collection, data display). It was felt that these revisions made the model more efficient and more broadly applicable.

Status in September 1974

By September 1974, three programs were prepared for secondary fieldtesting: The Shoe Tie Program, The Time Telling Program, and The Ruler Measurement Program. Three other programs were in the second phase of initial fieldtesting: The Make Change Program, The Metric Ruler Measurement Program, and The Clothes Fastening Program. Four supplementary programs were also prepared for second phase initial fieldtesting: Shoe Lacing and Shoelace Tightening (extensions of The Shoe Tie Program), and two sequences to teach the use of simple fractions involved in the measuring programs. Due to funding cuts (Fall, 1974) and the resulting personnel limitations (one full time, one 25% time), Team III's scope of work for 1974-1975 was altered to include only four of these ten programs. The schedule of activities this year was as follows:

I. Continue refinement of prototypic model procedures through actual instructional program development.

A. The Shoe Tie Program

1. Complete secondary fieldtesting with approximately 25 subjects varying in age and level of measured intelligence.
2. Analyze secondary fieldtest data, make necessary revisions, and produce multiple program packages for final fieldtesting.
3. Conduct final fieldtesting and prepare instructional program for dissemination.

B. The Time Telling Program

1. Complete secondary fieldtesting with approximately 25 subjects varying in age and level of measured intelligence.
2. Analyze secondary fieldtest data, make necessary revisions, and produce multiple program packages for final fieldtesting.

3. Conduct final fieldtesting and prepare program for dissemination.

C. The Ruler Measurement Program

1. Conduct secondary fieldtesting with approximately 25 subjects varying in age and level of measured intelligence.
2. Analyze secondary fieldtest data, make necessary revisions, and prepare multiple program packages for final fieldtesting.
3. Submit to final fieldtesting.

D. The Clothes Fastening Program

1. Complete second phase of initial fieldtesting at the EEU.
2. Analyze initial fieldtest data, make necessary revisions, and produce multiple program packages for secondary fieldtesting.
3. Conduct secondary fieldtesting with approximately 25 subjects varying in age and level of measured intelligence.

II. Continue investigation and dissemination of the prototypic model for instructional program development.

A. Analyze secondary fieldtest data to determine:

1. Efficacy of differential program placement procedures based on pretest performance;
2. Optimum size of secondary fieldtest population;
3. Efficacy of fieldtest procedures as conceptualized in the prototypic model -- especially communication with and feedback from secondary fieldtest administrators;
4. Efficacy of program when administered by professional (teachers), paraprofessional (aides), or non-professional (volunteers) personnel.

B. Refine the final fieldtest component of the prototypic model as instructional programs under development reach this stage.

C. Disseminate the prototypic model through professional journals, workshops, and conferences.

Present Status

During the past year, three programs completed the secondary field-test stage of development, and one of these, The Shoe Tie Program, completed the final fieldtest stage. The Time Telling Program and The Ruler Measurement Program could not be submitted to final fieldtesting due to delays in the return of secondary fieldtest data. However, through The Shoe Tie Program, Team III was able to complete testing of the entire prototypic model. In addition, second phase initial field-testing of The Clothes Fastening Program was conducted at the EEU during two academic quarters this year (fall and winter, 1974-1975). The program was edited, multiple program manuals were produced, and appropriate child size fastening vests were made to complete the program package.

Because The Clothes Fastening manuals and vests were not ready for dissemination until the second week in April, it was difficult to locate classroom teachers who were willing to participate in secondary field-testing. Teachers were reluctant to initiate a new program late in the school year. Most of the teachers felt that with both a well-established daily classroom schedule and teacher and pupil absences they would not be able to complete the program by the end of the school year. Therefore, secondary fieldtesting of The Clothes Fastening Program was not completed. The authors believe this program would be successful in the public schools, however, and hope to receive data on it after the project is terminated. Team III has received many inquiries and requests for copies of the program.

Dissemination efforts this year were largely confined to distributing Team III's three major programs (shoe tie, time telling, ruler measurement) to fieldtest administrators. At each meeting with potential administrators, the project manager briefly described the purpose of Team III's research and the prototypic model. She also explained the goal of the instructional program(s) of interest to the teachers and the procedures involved in using the program(s). (Further discussion of these program dissemination meetings is included later in this report.) In addition to these meetings, formal presentations of Team III's research were also made this year. Table 5 is a detailed record of Team III's research dissemination for 1974-1975.

Table 5
Dissemination of Team III Research 1974-1975

Name	Title	Media	Group Served	No. Served	Location	Date
Snyder, L. K.	The Prototypic Model for Developing Instructional Materials	Lecture/slide show	Students and faculty, George Peabody College	300	Nashville, TN	9/74
Maser, J. T.	EEU Instructional Programs	Materials presentation	Staff, Northwest Center for the Retarded	14	Seattle, WA	9/16/74
Maser, J. T.	EEU Instructional Programs	Materials presentation	Inservice Training Administrators, Tacoma School District	5	Seattle, WA	9/25/74
Maser, J. T.	The Ruler Measurement Program	Materials presentation	Special Education Teachers, Commodore Bainbridge Middle School	3	Bainbridge Island, WA	9/25/74
Smith, D. D.	The Prototypic Model for Developing Instructional Materials	Lecture/slide show	State CEC, New Mexico	700	Albuquerque, NM	10/74
Edgar, E.	EEU Instructional Programs	Materials presentation	Principal and teachers, Lake Washington Special Education Center	6	Kirkland, WA	10/3/74
Maser, J. T.	The Time Telling and Shoe Tie Programs	Materials presentation	Special Education Director and teachers, Port Angeles Senior High School	4	Port Angeles, WA	10/7/74
Maser, J. T.	The Ruler Measurement Program	Materials presentation	Special Education Director and teachers, Bremerton School District	20	Bremerton, WA	10/8/74

308

309

Maser, J. T.	EEU Instructional Programs	Materials presentation	Teachers, Lake Washington Special Education Center	5	Kirkland, WA	10/9/74
Maser, J. T.	The Ruler Measurement Program	Materials presentation	Special Education teachers, Tacoma School District	12	Tacoma,	10/21/74
Maser, J. T.	Status of Team III Research	Discussion	Dr. D. D. Smith, Consultant to Team III	1	Nashville, TN	12/14/74
Maser, J. T.	The Lattice System of Sequence and Analysis of Instructional Programs	Lecture/slide show	Administrators, Office of Special Education, Maryland State Department of Education	2	Baltimore, MD	12/30/74
Maser, J. T.	The Ruler Measurement Program	Materials presentation	Special Education Director and teachers, Issaquah School District	6	Issaquah, WA	1/21/75
Maser, J. T.	The Ruler Measurement Program	Materials presentation	Special Education teachers, Edmonds School District	4	Edmonds, WA	2/11/75
Edgar, E.	The Prototypic Model for Developing Instructional Materials	Lecture	Special Education 565	25	Seattle, WA	2/24/75
Maser, J. T.	The Shoe Tie Program	Materials presentation	Special Education teachers, Maplewood School	10	Edmonds, WA	3/13/75
Maser, J. T.	The Clothes Fastening Program	Materials presentation	Omak Head Start teachers	12	Seattle, WA	4/8/75
Edgar, E., & Maser, J. T.	The Shoe Tie and Clothes Fastening Programs	Materials presentation	Students, North Seattle Community College	35	Seattle, WA	4/8/75
Edgar, E.	The Shoe Tie and Clothes Fastening Programs	Materials presentation	Seattle Central Community College	1	Seattle, WA	4/14/75
Maser, J. T.	The Ruler Measurement Program	Data discussion	Issaquah Junior High School, Secondary Fieldtest Administrators	2	Issaquah, WA	5/7/75

Edgar, E.	A Prototypic Model for Developing In- structional Materials	Lecture and materials presentation	Washington Educational Research Association	15	Seattle, WA	5/22/75
Smith, D. D., Smith, J. O., & Edgar, E.	A Prototypic Model for Developing In- structional Materials for the Severely Handicapped	Chapter	In Haring, N. G., & Brown, L. (Eds.), <u>Teaching Severely/Pro- foundly Handicapped Individuals</u> , 1975, Grune & Stratton, in press			1975
Edgar, E., Maser, J. T., & Haring, N. G.	Button Up! -- A Systematic Approach for Teaching Children to Fasten	Manuscript	<u>Submitted to Teaching Exceptional Children</u>			5/75

Application of the Prototypic Model:
Instructional Program Development

The preceding sections of this report dealt with the focus of Team III's research this year: the prototypic model for curriculum development. Detailed descriptions of each major component of the model were presented. Additionally, a brief overview of this year's research was presented.

In this final section, attention is turned toward the development of the individual instructional programs which served as the vehicles through which this model was evaluated and refined. For each program developed by Team III, the following information is presented: a) the terminal goal and target population of the program; b) the skill sequence which is taught in the program; c) the pretest procedures employed in the program; d) the lesson procedures and materials developed for the program; e) the results of this year's fieldtesting; and f) the program's current status.

The following features are common to all Team III programs.

1. For all these programs, the target population is defined in terms of entry behaviors and learning characteristics. No program developed by Team III is specific to any particular chronological or mental age group.
2. The pretest for each program is designed to assess the student's basal skill level for both the entry behaviors and the major goals of the program.
3. The teacher's role is clearly specified in all Team III programs. Directions, criteria, and materials are all provided. Statements to be made by the teacher are printed in capital letters and correct student responses are defined.
4. These programs are carefully worded and structured so teacher aides, volunteers, and helpers from other classrooms can serve as administrators.
5. The format selected for all these programs requires administration on a one-to-one basis.
6. The lessons are written in sequence and are taught in the order presented. However, not all students begin at Lesson 1. In each lesson, the student learns to complete a new step in addition to steps mastered in previous lessons. The teacher demonstrates the procedures specified in the lesson and assists the student to complete the desired student responses. A criteria statement in each lesson specifies what steps a student must be able to perform before moving on to the next lesson.

The Shoe Tie Program

Terminal Goal and Target Population

The goal of the Shoe Tie Program is to teach the student to tie his shoes. The prerequisite skills required of the student are the abilities to imitate others, grasp, and pull against tension. The Shoe Tie Program follows a skill sequence which progresses from pinching movements to actually tying a bow-knot on a shoe while it is being worn. This sequence is graphically portrayed in the lattice for Shoes Tied (see Figure 12).

Pretest Procedures

The pretest for the Shoe Tie Program consists of five sections. The information collected through this pretest answers the following questions:

- 1) Is the student able to tie a shoe?
- 2) Is the student able to untie a shoe?
- 3) Does the student have the fine motor proficiency required to string beads with either hand? (The proficiency criterion for this skill was set at three beads strung within 30 seconds.)
- 4) Is the student able to pinch a shoelace?
- 5) Is the student able to pull a lace against tension with either hand?
- 6) Is the student able to lace a shoe?
- 7) Is the student able to tighten the laces on a shoe?
- 8) Is the student able to put on a shoe?

An analysis of the pretest data reveals not only whether an individual has the prerequisite skills for entrance in the program, but also whether he has already mastered skills taught in the program. In the latter case, the pretest data facilitates the placement process.

Lesson Procedures and Materials

The lessons in the Shoe Tie Program are presented in the three column format illustrated earlier in this report (Figure 13). In this program, however, a fourth column is included for graphic illustration.

The Shoe Tie lessons correspond to the components identified in the task analysis, as represented by the lattice for Shoes Tied (Figure 12). Since the use of a backwards chaining procedure is most appropriate in a program designed to teach shoe tying, portions of the latticed sequence are taught in reverse. In Lesson #3, for example, the student tightens the bow already tied by the administrator. In Lesson #5, the student pushes the second lace through and completes the bow already started by the administrator. In Lesson #8, he tightens the half-knot (already tied by the administrator) and completes the bow. Finally, in Lesson #10, the student ties the entire bow-knot.

The "Remedo-Board" used in Lesson 2 was developed because many students nearly ready to begin the program did not have the necessary pinching and pulling skills for the shoe tying sequence. The "Remedo-Board" is a simple device designed to familiarize students with the pinching and pulling motions used to tie shoelaces. It consists of a piece of wood drilled with two holes in which knotted shoelaces are secured for practicing these motions.

An illustrated glossary of terms included at the beginning of the teacher's manual, explains the specific terminology and movements employed in the lessons. Also, data sheets which require only the scoring of criterion responses for each lesson are included for ten children.

Initial Fieldtest Results

Subjects. In the fall, 1973, six students at the EEU participated in the second phase of initial fieldtesting of the Shoe Tie Program. Four of these students were children enrolled in the Down's Syndrome Kindergarten program; two of these youngsters were five years old and the others were six years old. The fifth subject, from an elementary classroom, was an eight year old child, diagnosed as mentally retarded with behavioral problems. The sixth student was an 18 year old emotionally disturbed young man in a secondary classroom.

Procedures. Five instructors administered the in-house testing. Two of the five were Team III members; the remaining three were project or field study students working under the supervision of Team III.

Lessons provided the instructions used during the in-house testing. Any additional instructions or clarification provided by the instructors were either incorporated into the lessons or were added as possible remediation methods.

Results. One of the four kindergarten students, J., successfully completed the entire Shoe Tie Program in 21 sessions. After 44 sessions, 5 year old P. completed all but the last lesson, which teaches untying. The instructor reported that this boy had great difficulty in Lesson #10, which requires the student to tie his own, rather than the model shoe. It was not possible to obtain the parent follow-through at home needed to overcome this problem; therefore, P. did not finish the lesson sequence.

Neither of the two remaining kindergarten subjects completed this program. Problems of absenteeism, uncooperative behavior, and changing administrators each quarter may account for the program's failure to teach these students to tie their shoes.

The 8 year old student who participated in initial fieldtesting, J., successfully completed the entire lesson sequence in 11 sessions. The 18 year old subject, T., learned to tie his shoes in 7 sessions. Both of these students entered the program at Lesson #3, having demonstrated proficiency on the pretest in the skills taught by the first two lessons.

Discussion. The data indicated that this program is effective in teaching the skill of shoe tying to students who possess the necessary entry behaviors, regardless of chronological age. There was a great difference, however, between younger (ages 5 and 6) and older (ages 8 and 18) subjects in the number of sessions needed to achieve skill mastery. There is some question as to the practicality of this program for very young children, given the limited amount of time which a teacher has to spend with this age group (usually in school for only one-half day).

Secondary Fieldtest Results

In September, 1974, local school district administrators were contacted and requested to inquire if any of their teachers would be interested in participating in secondary fieldtesting of The Shoe Tie Program. Seven separate school districts indicated an interest in the program, and initial meetings were arranged with approximately 24 individuals who were specifically interested in using this program. These initial meetings were similar to those held for the time and ruler programs and, therefore, will be described in detail only once.

The project manager met with the potential administrators at their respective schools. She explained the prototypic model briefly and the purpose of the secondary fieldtest stage of developing The Shoe Tie Program. She then described how the program is used -- the methods for scoring the pretest data sheet, placing a child in the program, administering the lessons, and scoring the data sheet. The contingencies for using the program were also explained. Due to the limited number of teacher's manuals available, all materials had to be returned to the EEU at the conclusion of the program, and only those schools with at least 5 pupils eligible for the program could be included in the secondary fieldtest. In addition, the teachers would be responsible for having the Program Project human subject release form signed by each subject's parent or guardian and returned to the EEU.

From these meetings, 18 of the 24 teachers volunteered to administer The Shoe Tie Program to 33 pupils. The teachers were asked to schedule shoe tie sessions daily so that their pupils could complete the program by December 2. This date allowed for 40 instructional days in which to complete the 11 lessons in The Shoe Tie Program. Team III felt that this was ample time, allowing for absences and repeated lessons, and that holding to this schedule, the program could be prepared for final fieldtesting by January 15.

Two weeks after the teachers started the program, the project manager contacted each teacher by mail requesting confirmation of the number of students enrolled in the program and the projected completion date for these children. Those teachers who did not respond by mail were telephoned. Upon receipt of their data, each teacher was mailed a questionnaire designed to determine if the teachers liked using the program, what problems they encountered with it, and whether they had any suggestions for improving the program. An in-person meeting was

then held with the teachers in Western Washington to discuss the questionnaire and gain additional feedback. These data were compiled with the student performance data in order to evaluate the effectiveness of the program.

Subjects. All of the pupils in the secondary fieldtest population for The Shoe Tie Program had learning problems ranging from severe retardation to moderate developmental lags with considerable behavioral disorders. The pupils were well past the age when the skill of shoe tying is normally expected to occur and had experienced numerous failures in attempting to learn basic self-help skills. One teacher's comment, "If this child, who has very low academic abilities, can successfully complete the program, I feel almost anyone would be successful," typifies this population.

Procedures. The Shoe Tie Program was fieldtested by many different administrators, including teachers, volunteers and student teachers. Procedures were identical to those employed in initial fieldtesting, except that administrators had minimal contact with the programmer. Therefore, the instructions found in The Shoe Tie Program manual provided only the direction for administration of the lessons.

Results. Because of scheduling problems, teacher and pupil absences, and numerous other difficulties including behavior problems, The Shoe Tie Program administrators were unable to complete the program by the target date, December 2. None of the teachers, however, wanted to terminate the program and requested extensions on the time originally allotted for secondary fieldtesting. As a result, the majority of the data were not received until late January, 1975. (Christmas vacation accounted for further delays.)

After a maximum of 45 instructional days, 12 teachers reported data on 25 pupils. Of those 25 pupils, 12 successfully completed the program (see Table 1 in the first section of this report).

The range of instructional days needed to meet criterion was 10 to 36, with a median of 19 days. Three additional students (two who did not have laced shoes and one confined to a wheelchair) completed Lesson 9 which required that they be able to tie the model shoe. Thus, 15 of 25 students successfully learned to tie shoes. The remaining students experienced various problems with the program. One student's visual acuity problems impaired his performance, and he was removed from the program until appropriate corrective lenses could be provided. Three other students (the poorest performers) had excessive behavioral problems and could not be controlled by their teachers. One child made no progress after Lesson 4, and several others were frequently absent.

Discussion. Each frame of the program was analyzed to determine if rewriting was necessary before submitting the program to final fieldtesting. "Pushes lace through hole," objectives 14 and 18, were the only obvious problem areas in the program (see Table 2). Setting a reasonable criterion of three days per lesson, these two objective checks in Lessons 5 and 6 appeared to be problematic. By Lesson 7, this same objective (22, "pushes lace through hole") no longer had a high error rate.

The Shoe Tie Program was submitted to final fieldtesting without major rewriting. However, the program contained a warning to teachers that objectives 14 and 18 appear to be the most difficult to learn. The teachers were encouraged to give their students extra practice on this skill and to use tangible reinforcers if necessary.

From the follow-up questionnaire sent to all participating teachers, the only suggestion consistent across the majority of teachers dealt with the use of verbal instructions to the students. Many teachers did not feel comfortable with the words they were asked to say to the student. Further, they felt awkward and at times unable to hold the student's attention while referring to their manual to see what they were to say next. Therefore, the final fieldtest administrators were told they had complete freedom to alter the verbal directions at their discretion; however, they were asked to follow the sequence and procedures as described in the program.

Final Fieldtest Results

Final fieldtesting of the Shoe Tie Program began in late February and early March, 1975. Initial meetings were held with 27 individuals who were specifically interested in using this program. Eighteen (18) of these individuals volunteered to test the program with 36 pupils. The teachers were asked to schedule shoe tie lessons daily so that their pupils would have ample time to complete the programs by the end of the school year.

Subjects. Nine (9) teachers returned data on 25 subjects. All of the subjects were enrolled in classrooms in the state of Washington. The specific locations and the respective number of subjects were as follows: Omak, 5; Seattle, 4; Tacoma, 3; Kirkland, 2; Port Angeles, 1; Edmonds, 2; Everett, 7.

Team III made no attempt to specify specific types of children or age ranges to be included in this population. Subjects were selected by their teachers and by the pretest for this program.

Procedures. The Shoe Tie Program was fieldtested by 9 administrators who were teachers, teacher aides, a classroom volunteer, and one occupational therapist. Procedures were the same as those employed in secondary fieldtesting with one major exception. Final fieldtest administrators were given complete freedom to alter the verbal directions to the student as written in the manual. The teachers were asked to follow the sequence and procedures as described in the manual, but they were not required to follow the lessons word for word as in secondary fieldtesting.

Results. After a maximum of 25 instructional days, 9 administrators reported data on 25 pupils. Of these 25 pupils, 9 successfully completed the program (Table 3). The range of instructional days needed to meet criterion was 3 to 15, with a median of 8 days. Two (2) additional children completed lesson 9 which required that they be able to tie the model shoe. Thus, 11 out of 25 students successfully learned to

tie shoes. Two (2) other students left school before completing the program, two (2) were still working on the program when school ended for the year, and two (2) failed the pretest (Table 4). The remaining eight students were reported to have lost interest in the program.

Discussion. Each frame of the program was analyzed to determine if rewriting was necessary. Setting a criterion of more than three days per lesson as an indication of problem frames, criterion steps 11 (holds first loop in place with assistance) and 12 (pulls loop away from hole) were the only objectives which appear to have caused problems. Five (5) pupils required more than three (3) days to acquire those two skills. Interestingly, objectives 14 and 18, which were problems during secondary fieldtesting were not problems during final fieldtesting. When the data from both secondary and final fieldtesting are combined (Tables 2 and 4), there do not appear to be any problem lessons.

The data from the follow-up questionnaires received from the participating administrators indicate that the teachers felt very comfortable with the added freedom as the use of verbal directions. Additionally, the administrators expressed general satisfaction with the program and a desire to continue to use the program with other children.

Two general comments about this fieldtest are appropriate. First, what many administrators called behavior problems or uncooperative behavior by their students in the program was the most consistent reason for pupils not successfully completing the program. The pretest does not measure this aspect of pupil readiness and the materials do not provide the teacher with special means to motivate or control non-compliant pupils. As with all instructional techniques, the teacher still maintains primary responsibility for insuring pupil compliance. Second, the materials appear to be well sequenced and very appropriate for a wide range of pupils. For individuals who possess the entry skills, the Shoe Tie Program is an efficient method for teaching the skill of shoe tying.

The Time Telling Program

Terminal Goal and Target Population

The terminal goal of the Time Telling Program is to teach students to read the time from a conventional clock (i.e., not a digital clock) to the nearest whole minute. In this program, the student is taught to use not only the formal "hour:minute" convention for expressing time, but also such commonly accepted phrases as "half past" and "quarter to".

This instructional program is intended for use with any student who does not know how to use or tell time and who possesses the following requisite entry behaviors:

1. Number recognition 1 - 59
2. Rote count 1 - 59
3. Write numbers sequentially 1 - 59

4. Count by 5's to 60
5. Count by 10's to 60
6. Discriminate between red and black

In order to assure the utility of this program with students who have general or specific learning disabilities, the lessons were designed to allow for substantial overlearning and frequent review. Supplemental remediation procedures are provided for students who need this extra assistance. The lessons in the Time Telling Program follow the sequence of skills identified through the task analysis graphically displayed in the lattice for Time Telling (Figure 14).

Insert Figure 14 about here

Pretest Procedures

The pretest for the Time Telling Program serves two functions. First, it assesses a student's basal skill level. Second, the pretest indicates where the student should be placed in the program, if the need for advanced placement is indicated by the pretest data.

The pretest consists of nine sections and requires approximately 15 minutes to administer. Specific questions answered by each of these sections are:

- 1) Can the student identify the numbers from 1 to 12?
- 2) Can the student count from 1 to 12?
- 3) Can the student write the numbers from 1 to 12?
- 4) Can the student count by tens from 10 to 50?
- 5) Can the student count by fives from 5 to 55?
- 6) Can the student identify the numbers from 5 to 55 by fives?
- 7) Can the student identify the hour and minute hands?
- 8) Can the student identify the times shown on clocks set to different intervals of five minutes after each of the hours?
- 9) Can the student write the times shown on clocks set to different intervals of five minutes after each of the hours?

Lesson Procedures and Materials

The Time Telling Program consists of five sections corresponding to the major subgoals of the lattice for this skill. The Clock Hand Discrimination section consists of 3 lessons which teach the student to identify the hour and minute hands. The Hour Hand section, comprised of 6 lessons, focuses on the hour hand in isolation. The next section of 20 lessons, Minute Hand, teaches the minute hand, to the nearest whole minute, in isolation. The 6 lesson Time section teaches students to

tell time using both the hour and minute hands. The final section, Gross Minute, consists of 5 lessons which teach the use of non-exact phrases for expressing time.

In addition to the teacher's manual, the time telling program package consists of a student workbook and numerous aids. These materials represent a carefully developed and tested sequence of color and number cues which are gradually faded as the student progresses through the lessons. The time telling program's data collection and data display systems allow the administrator to record each pupil's responses on 5 x 8 inch cards. These data cards are sufficiently rigid and small enough to be scored in the teacher's lap. Two separate percent-graphs are used to display the cumulative data for responses elicited in the one-to-one tutorial situation, and those produced independently on written worksheet tasks.

Initial Fieldtest Results

Subjects. In the fall, 1973, two students were selected from EEU classrooms to serve as subjects for the last in-house fieldtesting of the Time Telling Program. One of these, an eleven year old boy with Down's syndrome, attended an intermediate classroom. The other student was a nine year old girl diagnosed as emotionally disturbed. By teacher request, the program was also administered to several students in intermediate and secondary classes at the EEU. All subjects possessed the requisite entry behaviors, but lacked the time telling skills taught in this program.

Procedures. The program was administered by the program's writer and classroom teachers at the EEU. Procedures specified in the program lessons were adhered to strictly and no additional instructions, materials or reinforcement were employed.

Results. The two subjects of this fieldtesting performed consistently at or above the 90% correct criterion level on all lessons administered. One of these students was withdrawn from the EEU and did not complete the program. The other subject completed the sequence, although the exact minute lessons were omitted since he lacked the prerequisite counting skills.

The teachers who administered the Time Telling Program in their own classrooms reported that their students successfully completed the lesson sequence. Several of these teachers requested the additional materials needed to implement this program with more of their students.

Discussion. The Time Telling Program was developed through the second phase of initial fieldtesting during the 1972-73 academic year. However, the production of materials for dissemination to secondary fieldtest sites necessitated the use of a production process different from that used to prepare the original set of instructional materials for this program. Before distributing the instructional program packages for secondary fieldtesting, the program writer decided to administer the

program, using these new materials, to two more subjects at the EEU. Also, several EEU teachers administered the program to students in their classes.

The results indicated that the new materials, used in conjunction with the program lessons, were effective in teaching the skill of time telling to students possessing the requisite entry behaviors. Furthermore, the program was enthusiastically received by those teachers at the EEU who employed it in their own classrooms. Therefore, the program lessons were submitted to final editing (Spring, 1974), and the teacher's manuals and data cards were prepared for dissemination to secondary fieldtest sites.

Secondary Fieldtest Results

Secondary fieldtesting of The Let's Tell Time Program was initiated in September, 1974. The procedures for contacting potential administrators of the program in the public schools and for disseminating the program packages were the same as for The Shoe Tie Program. Initial meetings were arranged with approximately 15 individuals who were specifically interested in using this program. Ten (10) of these individuals volunteered to use the program with 42 of their pupils. The administrators were asked to schedule time telling lessons daily so that their students could complete the program no later than January 15, 1975. This date was set for two reasons: (1) to allow ample time (approximately 60 instructional days) to complete the 36 lessons in the program, and (2) to allow Team III a minimum of one month to analyze the data, make necessary revisions, and prepare the program for final fieldtesting.

Subjects. Eight teachers returned data on 26 subjects. All of the subjects were enrolled in classrooms in the State of Washington and Alberta, Canada. The specific locations and the respective number of subjects were as follows: Seattle, 3; Tacoma, 9; Port Angeles, 6; Granger, 4; Canada, 4.

Team III made no attempt to specify specific types of children or age ranges to be included in this population. Subjects were selected by their teachers and by the pretest for this program. Team III avoided influencing this selection process because one purpose of fieldtesting was to ascertain if the pretest was successful in selecting pupils and placing them appropriately in the program. Therefore, subjects were selected based on their teacher's initial recommendation, and on their pretest data.

Procedures. The Let's Tell Time Program was fieldtested by 8 administrators who were either teachers, student teachers, or classroom aides. Procedures were identical to those employed in initial fieldtesting except that administrators had minimal contact with Team III. Therefore, the instructions found in the teacher's manual provided the only direction for administration of the lessons.

Results. Of the 26 pupils who took part in fieldtesting the Let's Tell Time Program, 19 finished the program. Of these 19, the teachers reported that 12 could accurately tell time from clocks and/or watches upon completing the program (Table 6). Of the 7 students who did not complete the program, one left school, one teacher did not have sufficient time to administer the program regularly, one child was absent an excessive number of days, one teacher was dissatisfied with the program and stopped using it, and three children were noncompliant.

Insert Table 6 about here

The data from this program is questionable due to an oversight in the teacher's manual. The criterion of 90% correct for advancing to the next lesson was omitted and, as a result, many students progressed through the program with lesson scores well below the 90% criterion. This fact obscures the secondary fieldtest data and makes an accurate evaluation of the program impossible.

Discussion. The return of secondary fieldtest data on the time program was delayed well beyond the January 15 target date due to a wide variety of complications: a teacher strike in Tacoma; change of classroom personnel in one fieldtest site; lack of teacher aides or teacher time in several fieldtest classrooms; extensive absences among the fieldtest population; and changing placement for some of these pupils. As a result of these problems, data on only 10 subjects were received in early February; data on the remaining 16 subjects was returned sporadically throughout the spring, 1975. Team III analyzed the data on the first ten subjects in February to see what revisions, if any, would need to be made prior to submitting the program to final fieldtesting. The coordinator felt, however, that these decisions could not be made until more data was received. In addition, with only two staff members (one full-time staff member), the delay in receiving the data further increased the difficulty of locating potential administrators and disseminating the program to them for final fieldtesting. The situation was further complicated because in order to submit the program to final fieldtesting, those secondary fieldtest administrators who were still using the program would have been forced to terminate the program before completion. These teachers were anxious to continue the program, and Team III was reluctant to accept incomplete data. For these reasons, The Let's Tell Time Program was not submitted to final fieldtesting.

Because the criterion for advancing through the lessons was omitted from the program manual, an accurate analysis of the time telling lessons is impossible. However, lessons H-2, H-5, M-3, M-10, M-18, M-19, m-20, T-2, T-3, GM-1, GM-2, GM-3, and GM-4 have an excessive number of students below the 90% criterion level (Table 6). These lessons should be examined for possible revisions.

Although all but one teacher expressed great satisfaction with the program, one suggestion for improving the program was commonly made by the teachers. All the teachers reported that students should have structured practice sessions with actual clocks and/or watches during the course of the program. Several of the teachers independently initiated this type of experience for their students and reported success -- their students were able to generalize their newly acquired skills from the time telling workbook to actual clocks and watches. Additionally, two children who received wrist watches from their parents were reported to have a high level of interest in the program. Several teachers reported that although their students successfully completed the time program, the students could not accurately tell time from real clocks (as opposed to the clock faces included in the program package and the student workbook). This problem indicates the need for structured and systematic lessons to facilitate generalization from the workbooks and instructional aids to actual clocks and watches.

As with the Shoe Tie Program, teachers found the sequence and instructional procedures of the Let's Tell Time Program applicable to large numbers of students. However, some students who were non-compliant in other areas, were also noncompliant during their time telling sessions. This problem of noncompliance or student interest appears to be a factor that only the teacher can control and is outside the purview of instructional procedures.

The Ruler Measurement Program

Terminal Goal and Target Population

The terminal goal of the Ruler Measurement Program is to teach the correct use of a 12 inch ruler. The threefold goal is to teach the student to use the ruler in three ways: 1) measure line segments; 2) rule paper; and 3) divide line segments into equal parts. The program is intended for use with any student who lacks these ruler measurement skills but who possesses the necessary entry behaviors.

The prerequisite skills for the first six sections of the program are: grasp motion; turn motion; count and identify numbers from 1 to 12; precise use of pencil; identify ruler; concept of top and bottom; concept of fractions; write fractions, $\frac{1}{8}$, $\frac{1}{4}$, $\frac{1}{2}$. (A supplemental lesson sequence was written during the 1973-1974 academic year to teach these fraction skills to students possessing the other entry behaviors. However, Team III was unable to continue work on this program this year due to the change in funding at the beginning of the year.) With these skills, a student may enter the sections which teach measuring line segments and ruling paper; however, these skills are not sufficient to meet the goals of the final two sections. The student must show proficiency in simple division by two and four to enter the final sections on dividing line segments. The program is written so that even those students who lack the skills necessary to complete the last two sections may enter and complete the first six sections.

Skill Sequence

The eight sections of the Ruler Measurement Program (indicated by the criterion tests) correspond to the major subgoals along the ridge-line of the lattice for Uses Ruler, presented in Figure 15. Similarly, the content and arrangement of the individual lessons follow the sequence of skills or enroute objectives identified in the initial task analysis. The first three sections teach the student to measure line segments to the nearest $\frac{1}{2}$, $\frac{1}{4}$, and $\frac{1}{8}$ inch, using a 12 inch ruler. The next three sections teach the student to rule lines on a blank sheet of paper in the same place as the lines already drawn on a model. The final two sections teach the student to divide line segments into halves and fourths. The student may not enter any of these sections until he masters the skills taught in the preceding sections.

Insert Figure 15 about here

Pretest Procedures

The information collected through the pretest for the Ruler Measurement Program answers the following questions:

- 1) Does the student possess the fine motor control to grasp and turn a ruler?
- 2) Is the student able to count from one to twelve?
- 3) Is the student able to identify the numbers from one to twelve both sequentially and out of order?
- 4) Does the student possess the fine motor control to manipulate a pencil through precision tasks?
- 5) Does the student understand the concepts of top and bottom?
- 6) Does the student understand the concept of fractions?
- 7) Can the student write fractions?
- 8) Does the student have simple division skills?
- 9) Does the student understand the concept of the starting and ending points of a line segment?
- 10) Is the student able to mark off 1 inch, $\frac{1}{2}$ inch, $\frac{1}{4}$ inch, and $\frac{1}{8}$ inch increments of a line using a ruler?

- 11) Is the student able to measure line segments to the nearest inch, $\frac{1}{2}$ inch, $\frac{1}{4}$ inch, and $\frac{1}{8}$ inch?
- 12) Is the student able to rule paper?
- 13) Is the student able to divide line segments?

An affirmative response to each of the first seven questions is prerequisite to the student's entry into the program. Question 8 refers to the additional entry behavior needed for placement in the last two sections of the program. The last five questions correspond to the major skills taught in the program.

Lesson Procedures and Materials

The Ruler Measurement Program, written during the 1972-1973 academic year, consists of 36 lessons and 8 criterion tests. The criterion tests, spaced throughout the sequence, assess a student's mastery of specific skills taught in preceding lessons. Successful completion (at least 90% correct) of each criterion test is required before a student may progress to succeeding lessons.

The lessons are written in the three column format described earlier and are intended for administration on a one-to-one basis. The program includes the use of two different types of instructional materials: non-consumable aids (plasticized models and a sequenced set of plastic rulers), and approximately 150 consumable worksheets.

The systems for data collection and display employed in the Ruler Measurement Program are similar to those used in the time telling program. The data sheets are fit on 5 x 8 inch cards which can be scored in the teacher's lap. Additionally, a cumulative data form included in each student's workbook provides a concise record of that student's progress through the entire program. This form eliminates the necessity of going through all the individual data cards when only a general overview of the student's performance is desired (e.g., for parent conferences) and also provides a concise record for the student's permanent file.

Initial Fieldtest Results

Subjects. Throughout the 1973-1974 academic year, four students participated in the second phase of initial fieldtesting of the Ruler Measurement Program. All were students at the EEU. One was an eleven year old boy with Down's syndrome from one of the elementary classrooms. One was an eleven year old boy, considered learning disabled and emotionally disturbed from an intermediate classroom. One was a twelve year old learning disabled boy in an intermediate class. The fourth subject was a thirteen year old boy with learning and language disabilities.

Procedures. The program was under the immediate supervision of a Team III intern who administered the program to three subjects. Walter Berlin, another Team III intern, served as instructor for the fourth subject in the program.

The lessons provided the instructions used during this phase of initial fieldtesting. Any additional instructions, clarifications or materials provided by the instructors were either incorporated into the revised lessons or were added as suggested remediation techniques.

Results. One of the subjects was withdrawn from school and did not complete the program. He had progressed through Lesson number 10, scoring 100% correct on every lesson. The last subject to whom the program was administered did not successfully complete the program for two reasons: 1) he lacked the fraction skills which were later made prerequisite to entry into the program, and 2) lack of time due to the closing of school for summer recess, which made it impossible to provide the needed remediation in these skills.

Thus, only two subjects, T. and B., successfully completed the program. As neither of these students possessed division skills, the last six lessons and two criterion tests were not administered. On entering the program, T. did not possess any fraction skills and this lack is reflected in his initial performance on Lessons number 15 through 22. A supplemental lesson sequence to teach these skills was concurrently written and administered to this subject, enabling him to complete the measurement lessons.

B., the second subject to complete the program, demonstrated that he was proficient in the prerequisite fraction skills on the Ruler Measurement Pretest. This student was able to complete the lessons at or above the 90% criterion level on all but two days. The administrator reported that behavior problems accounted for the low number of correct responses on these two days.

Discussion. The data from the second phase of initial fieldtesting indicated that the Ruler Measurement Program is effective in teaching the skills of measuring line segments and ruling paper. Because no student was found at the EEU who possessed the necessary division skills but was deficient in ruler measurement skills, the lessons which teach division of line segments were not administered.

Secondary Fieldtest Results

Secondary fieldtesting of the ruler program was initiated in September, 1974. The procedures for contacting potential administrators and disseminating the program to fieldtest sites were the same as for the shoe tie and time telling programs. Initial meetings were arranged with approximately 38 individuals who were specifically interested in using the ruler program. From these meetings, 13 teachers volunteered to use the program with 49 of their pupils.

Team III encountered many problems locating these fieldtest administrators and subjects for The Ruler Measurement Program. Prior to scheduling the initial meetings to discuss the program, several school district administrative personnel were contacted and requested to inquire if their teachers had students with the entry behaviors specified in the pretest for this program. Many teachers responded that their students did not have a concept of simple fractions and/or did not possess the necessary division skills. Those students who did have these skills often were able to use a 12" ruler and thus did not need the ruler program. As a result of these difficulties, Team III did not have a sufficiently large secondary fieldtest population until winter, 1975. The problem was compounded by the fact that many teachers who originally volunteered to test the ruler program with their students dropped out of the project either after administering the pretest or soon after beginning the lesson sequence. The program's failure to meet these teacher's needs can be explained in several ways: (1) pretest data for some pupils showed they already had ruler measurement skills; (2) many pupils did not have the minimum entry skills to begin the program; (3) some teachers could not find the opportunity to provide an average of 15 minutes of one-to-one instruction on ruler measurement skills to each of 5 pupils daily; (4) some teachers found it difficult to hold their pupil's attention -- Team III received numerous reports from teachers that for those students who possessed the prerequisite entry skills, the progression of steps in the lessons is too finely sequenced (slow), and the words the teacher is asked to say to the student are too simple (belittling). It should also be noted that all of the teachers who originally committed themselves to secondary field-testing of the ruler program felt a responsibility to complete the program. Those teachers who were unable to follow through were very apologetic.

Subjects. Despite these problems, 5 teachers (3 of whom were each assisted by an aide) out of the original 13 returned data on 20 subjects. Fourteen (14) of these subjects were enrolled in two schools in the Issaquah School District; four (4) attended a resource room in a Bainbridge Island school; and two (2) were students in the Tacoma School District.

As with the shoe tying and time telling program, Team III made no attempt to specify specific types of children or age ranges to be included in this population. Subjects were selected by their teachers and by the pretest for this program.

Procedures. The entire Ruler Measurement Program was fieldtested by 5 teachers and 3 teacher aides. Procedures were identical to those employed in initial fieldtesting except that administrators had minimal contact with Team III personnel. Therefore, the instructions found in the teacher's manual provided the only direction for administration of the lessons.

Results. Of the 20 pupils who started the ruler program only one (1) completed the program (Table 7). This data clearly indicates that the Ruler program did not meet the needs of the program administrators

or their students. Although the majority of students completed each lesson above the 90% criterion, the teachers indicated that the program was too finely sequenced for students who possessed the entry skills (knowledge of fractions to $1/8$ and simple division skills).

Insert Table 7 about here

Discussion. When secondary fieldtesting of the ruler program was initiated in September, Team III set January 15, 1975 as the target date for return of the data. As with the time program, this date was set to allow ample time for pupils to complete the program's 36 lessons and 8 criterion tests, and for Team III to analyze the data and prepare the program for final fieldtesting. However, due to the problems encountered in locating fieldtest sites and teachers' problems administering the lessons it was not possible to submit the program to final fieldtesting. Because the ruler program is the longest of the Team III three programs submitted to secondary fieldtesting, initial meetings with potential final fieldtest administrators would have had to have been held in mid-February. In the case of The Let's Tell Time Program, Team III would have submitted the program to final fieldtesting if time had allowed. Initial feedback from fieldtest administrators of the ruler program indicated a need for considerable rewriting; these concerns coupled with extensive delays in the return of secondary fieldtest data made it impossible for Team III to prepare the program for final fieldtesting.

Although at this time the ruler program may be classified as a failure, the data obtained from secondary fieldtesting is valuable. Too often, developers of instructional materials devise programs which do not meet the needs of large numbers of pupils. The authors of the Ruler Measurement Program developed a finely sequenced program that met the needs of a small population of pupils (during initial fieldtesting). However, the need for this program as it now exists was clearly disproved by the secondary fieldtest data. With major alterations (such as eliminating the need for the prerequisite skill of a concept of fractions) this program might be successful. Most important is the fact that the potential consumers, teachers and students, had the major role in determining that the program in its present form is of little value.

The Clothes Fastening Program

Terminal Goal and Target Population

The terminal goal of the Clothes Fastening Program is to enable a student to develop sufficient proficiency in the fastening skills of zipping, unzipping, snapping, unsnapping, buttoning, and unbuttoning to

apply these skills to his everyday dressing and undressing needs. In order to teach these skills, three mini-programs were written during the 1973-1974 academic year. The programs and their respective terminal goals are: (a) zipping--to independently zip and unzip the front closing of a garment while it is being worn; (b) snapping--to independently snap and unsnap the front closing of a garment while it is being worn; and (c) buttoning--to independently button and unbutton the front closing of a garment while it is being worn. These programs were extensively revised and edited this year based on second phase initial fieldtesting at the EEU. Multiple copies of the teacher's manual were produced and clothes fastening vests were made to complete the program package.

This instructional program is intended for use with students who have failed to learn these fastening skills, but possess the following entry behaviors: can pinch, can pull, can push, and can imitate.

Skill Sequence

The lessons in each mini-program correspond to specific component skills identified through a systematic task analysis. The lessons within each program, as revised this year, are written in a backward chaining sequence -- the last step in the sequence normally followed to complete the task is the first step taught in the program. In zipping, for example, the last step is to pull the zipper up. The first lesson of the zipping program teaches pinching the zipper handle and pulling it up. Using backward chaining, a skill, which to a child may seem very complex, is carefully broken down (sequenced) and arranged so that the child can find immediate success in completing the task. As the child gains confidence with his first success, he will eventually perform the second step in addition to the first. Each lesson within one of the fastening programs incorporates and adds to the skills acquired in the previous lesson.

At the end of every lesson, there is a criterion for advancing to the next lesson to insure that a student does not attempt a new step in the sequence before he is confident with the steps he has already learned. In most cases, the criterion for advancing to the next lesson is that the student perform the new step, in addition to the steps learned in previous lessons, three consecutive times correctly without assistance. The number of days required to meet this criterion varies with each child; only one lesson is taught each day to allow the child time to absorb the lesson before continuing practice or advancing to the next lesson.

Pretest Procedures

The Clothes Fastening pretest was revised to include two (as opposed to the original seven) sections which can be administered in approximately 15 minutes. The first section is designed to determine if a student has the skills necessary to begin one or all of the programs. Section 2 determines if the student already has the skills taught by the programs, and/or how proficient he is at completing the tasks.

In order to begin one of the three mini-programs, a student must successfully complete (visual cues are allowed) the five items in Section 1:

1. Holds up hand.
2. Holds up thumb.
3. Touches thumbs in front of body midline.
4. Strings 3 beads in 45 seconds, holding lace in left hand.
5. Strings 3 beads in 45 seconds, holding lace in right hand.

Section 2 of the pretest is designed to tell the teacher if the child can perform the following 6 tasks on the appropriate clothes fastening vests included with the program package.

1. Can engage, zip up, and lock zipper independently.
2. Can unzip independently.
3. Can snap 2 snaps independently.
4. Can unsnap 2 snaps independently.
5. Can button 2 large horizontal buttons independently.
6. Can unbutton 2 large horizontal buttons independently.

The student's performance on each of these tasks is timed to give the teacher an indication of the student's proficiency in zipping, snapping, and buttoning skills. For example, if a student buttons two large horizontal buttons independently, but requires two minutes to completion, the teacher is advised to enter that student in the buttoning program to increase his proficiency.

Section 2 is also recommended for use in determining a child's proficiency with more difficult zippers, snaps, or buttons than those provided in the program package. For example, if a student is proficient in fastening the zipper, snaps, or buttons on the program vests, but is unable to fasten one of these types of closures on his own clothes, the teacher is advised to enter the child in the respective program using the child's own jacket, sweater, etc., as the teaching aid.

Lesson Procedures and Materials

The Clothes Fastening Program consists of three mini-programs which comprise 18 lessons. Based on second phase initial fieldtesting over two academic quarters this year (fall and winter, 1974-1975), the programs were extensively rewritten and edited. The basic sequence of steps used to teach zipping and snapping skills, however, was not altered -- only the buttoning program was changed appreciably. These changes are described in the section on Second Phase Initial Fieldtest Results.

The purpose of this section is to describe the three mini-programs in their current form; however, one significant change made in the fastening programs this year is described here because it represents a departure from the lesson format traditionally adhered to in Team III's

instructional programs. This change was initiated as a result of feedback from secondary fieldtest administrators of The Shoe Tie Program and second phase initial administrators of The Clothes Fastening Program. Many of these teachers reported that they wanted a framework within which they could easily adapt each lesson to individual children's needs. In The Shoe Tie Program, the procedures for repeating steps and fading assistance is described in detail -- every increment of instruction to the student is explained to the teacher. Many administrators felt this degree of detail was unnecessary and, in fact, nearly impossible to follow exactly when actually teaching a lesson. (Based on this feedback, final fieldtest procedures for The Shoe Tie Program allowed teachers to adapt the shoe tie lessons to individual pupil's needs.) As a result of this feedback, the fastening program lessons are simplified and leave specific procedures for repeating lessons and fading assistance to the teacher's discretion. Each lesson presents one concrete task to be accomplished and one method for teaching that task. At the conclusion of the lesson, the directions state that the teacher should repeat the lesson on consecutive days until the student can successfully perform the task three consecutive times correctly without assistance. The directions suggest that the teacher fade out assistance during these consecutive sessions until the student has mastered the task.

Zippering Program. The zippering program consists of seven lessons. The student wears a vest with a large zipper which he learns to engage, zip, and unzip. The following list describes the sequence used to teach these skills and the criterion steps a student must meet before moving on to the next lesson. The student must perform each criterion at least three consecutive times without assistance before moving on to the next lesson.

<u>Lesson</u>	<u>Criterion: 3 consecutive performances</u>
1. The teacher engages the zipper; the student pinches the zipper handle, zips up, and locks the zipper.	1. Zips up and locks zipper.
2. The teacher engages the zipper; the student holds the edge of the vest near the bottom left side of the zipper as he zips up and locks the zipper.	2. Holds vest down as he zips.
3. The student learns to pinch the zipper mechanism in order to engage it. The student holds the mechanism, the teacher inserts the slider, and the student zips it up.	3. Pinches zipper mechanism and zips up.
4. The student learns to pinch the slider and engages the zipper with assistance.	4. Pinches slider and engages zipper with assistance.

5. The student engages the zipper independently.

6. The student positions, engages, and zips up the zipper with no prompts.

7. The student learns to unzip.

5. Engages zipper.

6. Engages zipper and zips up without prompts.

7. Zips and unzips independently.

Snapping Program. For each of the five lessons in the snapping program, the student wears a vest with three large snaps which he learns to snap and unsnap. The student must perform each of the following criterion steps without assistance on at least three consecutive snaps before moving on to the next lesson.

Lesson

Criterion: 3 consecutive performances

1. The teacher positions both halves of the snap and holds the bottom half as the student uses his fingers to push the top half down until it fastens.

2. The teacher positions and holds the bottom half of the snap. The student learns to hold the top half of the snap and uses his thumb to push the top of the snap down until it fastens.

3. The teacher holds the bottom half of the snap. The child pinches the top half, lines it up with the bottom half, and fastens.

4. The student learns to pinch the bottom half of the snap and fastens independently.

5. The student learns to unsnap.

1. Fastens snap with fingers.

2. Fastens snap with thumb.

3. Positions top half of snap and fastens.

4. Snaps independently.

5. Snaps and unsnaps with no prompts.

Buttoning Program. At present, there are six lessons to teach buttoning and unbuttoning, using three large buttons on a child's vest with horizontal buttonholes. The teacher stands behind the student and demonstrates the buttoning procedure on the student's vest. We recommend using generalization procedures so students have continued practice with more difficult buttons.

In this program the student learns to pinch the buttonhole by placing his or her thumb over the buttonhole so that the thumb is pointing up -- the rest of the hand grasps the edge of the vest below the buttonhole. Because girls' clothes have buttons on the left, and boy's clothes have buttons on the right, we use appropriate vests for each sex. The term "buttonhole thumb" and "buttonhole hand" used in the following description of the lessons refer to the thumb or hand on the same side as the buttonholes on the child's vest. A boy will use his left hand to pinch the buttonhole, and a girl will use her right hand. "Button hand" refers to the student's hand on the same side as the buttons on his or her vest. The student must perform each of the following criterion steps without assistance on at least three consecutive buttons before moving on to the next lesson.

<u>Lesson</u>	<u>Criterion: 3 consecutive performances</u>
1. The teacher inserts the button halfway into the buttonhole. The student pinches the button and pulls it through the buttonhole while the teacher holds the edge of the vest below the buttonhole.	1. Pulls button through buttonhole.
2. The teacher inserts the button halfway into the buttonhole; the student pinches the edge of the vest below the buttonhole and pulls the button through the buttonhole.	2. Holds edge of vest below buttonhole while pulling button through buttonhole.
3. The teacher turns the buttonhold out so that from the back side of the buttonhold, the student can see the teacher's thumb as it covers the buttonhold. The student pinches the edge of the button and holds the button next to the teacher's buttonhole thumb. The teacher pulls the buttonhole over the button and the student finishes buttoning.	3. Pinches button, holds button next to teacher's buttonhold thumb, and repeats criterion step #2.
4. The student pinches the buttonhole and holds the button next to his or her buttonhold thumb. The teacher pulls the buttonhole over the button and the student finishes buttoning.	4. Holds button next to own buttonhole thumb, and repeats criterion step #2.

5. The student learns to hold the button next to his or her buttonhole thumb while he or she lifts up the index finger of the buttonhole hand and pinches the button. The student then releases his or her button hand and uses this hand to pull the buttonhole over the button while pulling the button through.

6. The student learns to unbutton.

5. Holds button next to buttonhole thumb, pinches button with buttonhole thumb and index finger, pulls buttonhole over button with button hand, and pulls button through.

6. Buttons and unbuttons independently.

Instructional Aids. In addition to the teacher's manual containing the three mini-programs, The Clothes Fastening Program package includes four child size vests -- one boy's button vest, one girl's button vest, one snap vest, and one zipper vest. Team III commissioned fifteen sets of these vests (60 vests total) made in preparation for secondary field-testing in April, 1975.

First Phase Initial Fieldtest Results

Subjects. Eight students served as subjects in the first phase of initial fieldtesting for the Clothes Fastening Program during the 1973-1974 academic year. These students, all 5 years old, were selected from the EEU's Preschool for developmentally delayed children and the Down's Syndrome Kindergarten. All demonstrated the necessary entry behaviors but did not have the fastening skills taught by this program.

Procedures. Lessons for each miniprogram were written to correspond to the sequence of steps identified through task analysis and displayed in the lattice for Clothes Fastening (included in Team III's Annual Report, 1974). As this was the first phase of initial field-testing, the lessons were revised and rewritten on a daily basis in accordance with student performance data.

Results. In initial fieldtesting, student performance was highly erratic and error pile-up was often encountered. This is not uncommon for the first version of any instructional sequence and, in fact, is the raison d'etre for Team III's highly structured approach to instructional program development. On the basis of the data collected, the lessons in this program were substantially and frequently rewritten during the 1973-1974 academic year. No student satisfactorily completed the program that year; therefore, no data will be presented here.

Discussion. Initial fieldtest results raised many questions about the sequence and materials employed in these mini-programs. A modified version of the program, substituting the use of fastening vests for the fastening boards called for in many lessons was planned for the second phase of initial fieldtesting.

Second Phase Initial Fieldtest Results

Second phase initial fieldtesting of The Clothes Fastening Program began in September, 1974, and continued through February, 1975. Team III had originally planned to conduct this phase of testing, make all necessary revisions, and complete editing and production of the program package in time to begin secondary fieldtesting during winter quarter (January-March, 1975); however, personnel limitations necessitated two academic quarters to complete this process.

Procedures. With one exception, the sequence of steps used this year to teach zipping and snapping skills (see section on Lesson Procedures and Materials above) remained essentially the same as the sequence tested in the first phase of initial fieldtesting. The original version of these two programs included practice on zipping or snapping boards at the beginning of the respective sequence. Because the visual and kinesthetic perspective involved in fastening on a board is quite different from that gained when fastening on the front of one's own body, these boards were omitted from fieldtesting this year. The lessons tested this year incorporated the same sequence of steps originally taught on the fastening boards, but the child wore an appropriate fasten vest and performed the steps on the vest.

The use of a fastening board was also omitted from the buttoning program for the same reasons. Second phase initial fieldtest results for all three mini-programs indicated that both teacher and pupil time were well spent on practicing fastening skills on actual clothing rather than on fastening boards. Work with fastening boards may be worthwhile for developing fine motor coordination; however, initial fieldtest data on these programs indicated that the skills did not generalize to fastening zippers, snaps, or buttons.

The buttoning program was substantially revised this year. The sequence of steps used to teach buttoning and unbuttoning this year is described above in the section on Lesson Procedures and Materials. During fall quarter, 1974, these lessons were revised on a daily basis according to student performance data (as per the prototypic model's initial fieldtest procedures). During winter quarter, 1975, these lessons were tested again to insure that the revised sequence was successful in teaching children to button and unbutton. Because there are numerous methods which can be used successfully to master buttoning, the program now includes several criterion options for determining a child's mastery of the buttoning process. The following excerpt from Lesson 5 in the buttoning program explains these options:

The step taught in this lesson, pinching the button before pulling it through the buttonhole, is often the most difficult step for students to master and may require a great deal more practice than previous lessons. The purpose of this lesson is to teach the student to hold the button next to the buttonhole as he moves his buttonhole hand up to pinch the button. Once the student has pinched the button, he should have no trouble finishing buttoning.

Therefore, after the student has learned how to line up the button and the buttonhole, do not discourage him if he develops his own method for inserting the button in the buttonhole. Some students may put their thumb and index finger through the buttonhole, pinch the button and pull it through. Other students may place their thumb and index finger on either side of the buttonhole and push the button into the hole before pinching the button. This also will work if the student does not have trouble holding the button next to the buttonhole.

Regardless of how the student inserts the button in the buttonhole, if his method works consistently for him it should be acceptable. Success in buttoning larger buttons will give the student a foundation for later practice on smaller buttons.

Zippering Program. Second phase initial fieldtesting of the zippering program was conducted by four administrators working with eight children enrolled in the Down's Syndrome Kindergarten and the Primary Classroom for the Severely Handicapped at the EEU. One of the children, Jimmy, was an 8½ year old boy enrolled in the Primary Classroom. Jimmy wore a zipper jacket to school every day, but before starting the program he consistently refused to attempt any part of the zippering process. Jimmy's zipper was more difficult to engage than most. If Jimmy was asked to help his teacher zip or unzip his jacket, his refusals became increasingly adamant. Thus, Jimmy's teacher decided that zippering was an important skill for him to acquire and entered him in the program. Jimmy completed the program in eight school days and now zips and unzips his jacket several times a day with great satisfaction in his new skill.

Snapping Program. Second phase initial fieldtesting of the snapping program was conducted by three administrators working with four children enrolled in the Down's Syndrome Kindergarten at the EEU. Pretest data for five year old Jane indicated that she could not fasten or unfasten a snap. After 14 days in the program, Jane successfully mastered both these tasks, and periodic follow-up checks showed that Jane has retained these skills.

Buttoning Program. Second phase initial fieldtesting of the buttoning program was conducted by three administrators working with seven students enrolled in the Down's Syndrome Kindergarten and the Communication Preschool at the EEU. Pretest data on three year old Anne indicated that she could button two large buttons in horizontal buttonholes with great effort, but that she was completely unsuccessful with smaller buttons. After 16 days in the program Anne successfully learned to button the smaller buttons.

Results. Secondary initial fieldtest data on the fastening programs was completed at the end of winter quarter, March 12, 1975. The data indicated the lessons were successful in teaching students the target skills. The lessons and instructional aids were prepared for secondary fieldtesting and were ready for distribution by April 7, 1975.

Discussion. Because the program manuals and instructional aids were not ready for dissemination until the second week in April, it was difficult to locate classroom teachers in the public schools who were willing to participate in secondary fieldtesting. Teachers were reluctant to initiate a new program late in the school year, although these same teachers were eager to include the program in their schedule for the 1975-1976 school year. Most of the teachers felt that with a well-established daily classroom schedule and both teacher and pupil absences, they would not be able to complete the program by the end of the school year. Therefore, secondary fieldtesting of The Clothes Fastening Program was not completed. The authors believe this program would be successful in the public schools, however, and would like to receive data on it after the project is terminated. Team III has received inquiries about the program throughout the past year and many requests for copies.

Summary

During the past three years, Team III conducted research on a prototypic model for developing efficient and effective instructional materials. According to this model, there are ten stages through which the programmer should progress in creating, refining, and validating an instructional program:

1. Before he begins writing, the programmer must have or acquire prerequisite knowledge of both the skill to be taught and programming techniques (e.g., cueing, fading, and chaining).
2. He must make initial decisions as to the exact skill he intends to teach and the population of children for whom he will design the program.
3. Once these decisions are made, the programmer completes a task analysis of the skill and displays it in lattice format (Smith, Smith, and Edgar, 1975).
4. From the lattice, he develops a pretest to assess whether a child can perform the target skill, and whether the child has the "entry" behaviors the programmer believes are necessary for mastering that skill (e.g., can pinch, can imitate).
5. At the same time, the programmer determines the appropriate format for his instructional program.
6. He then selects an initial fieldtest population based on pretest data from a group of children who have not mastered the target skill.

7. Five to ten children from this group are selected for initial fieldtesting.
 - a. During the first phase of initial fieldtesting, the programmer concurrently develops, tests, and refines each lesson and inexpensive instructional aids until his program package is complete.
 - b. He then conducts a second phase of initial fieldtesting to test the completed program with up to ten more children.
8. If the data from this population indicate the children learned the target skill in minimal time and with minimal error, the program is submitted to secondary fieldtesting. In this phase, teachers who are unfamiliar with the programmer's methods and materials volunteer to test the program with about twenty children. Data and feedback from this test are analyzed, and the program is revised to eliminate problem areas.
9. The program is then submitted to a final fieldtest -- a new group of teachers and/or paraprofessionals use the revised lessons with another 30 to 40 children. The data from this population are analyzed to determine if the revisions made as a result of the secondary fieldtest data actually reduced student and teacher error.
10. If the final fieldtest data indicate the program is effective in teaching the target skill, the final instructional program is prepared for dissemination.

During the 1973-1974 academic year, the efficacy of this model was evaluated through the development of several instructional programs. Fieldtest data gathered in this research generally validated the major components of the prototypic model. Several procedural modifications were made as student data and administrator feedback indicated the need for such revisions.

During the 1974-1975 academic year, Team III focused on the final components of the prototypic model -- secondary and final fieldtesting. The Shoe Tie Program completed the final fieldtest stage of development, and the data indicated the program is successful in teaching students to tie shoes. Additionally, Team III disseminated the results of the prototypic model research through various media including a chapter (Smith, Smith, and Edgar) to a forthcoming book for educators of the severely/profoundly handicapped (Haring and Brown, 1975). The majority of this chapter is included in the first section of this report (The Prototypic Model).

Conclusions

The prototypic model for developing instructional materials is one systematic approach that provides hard data on the effectiveness of any given instructional material before it is placed on the open market. A recent commentary by a publisher of instructional materials (Bleil, 1975) notes that professionals (consumers) must demand quality materials before the publishers (producers) will be compelled to maintain high standards. If this caveat emptor prevails at the marketplace, only the consumers can effect a change; purchase only proven materials!

Bleil (1975) also comments on the need for both child and teacher data statements. Basically, this means that educational materials must report not only on children's skill acquisition, but also on teachers' ability to use the material effectively and efficiently. The prototypic model produces data on both student and teacher performance. Initial, secondary, and final fieldtesting provide specific child performance data. Secondary and final fieldtest data yield information on teachers' ability to use the materials appropriately.

The development of effective instructional materials for handicapped children requires considerable time, effort, and money. Short cuts in program development result in short-changing handicapped students. As professionals responsible for the education of handicapped children, we must demand quality products. To do less is to abandon our responsibilities.

RESULTS OF SECONDARY FIELDTESTING - SHOE TIE PROGRAM

Lesson #1	1. Pitches and releases shoe lace
Lesson #2	2. Pitches loop with "strong" hand
Lesson #3	3. Pitches loop with "weak" hand
Lesson #4	4. Pitches loop with "strong" hand
Lesson #5	5. Pitches two loops simultaneously with corresponding hands
Lesson #6	6. Pulls loop with "weak" hand
Lesson #7	7. Pulls loop with "strong" hand
Lesson #8	8. Pulls two loops simultaneously with corresponding hands
Lesson #9	9. Pitches both loops of bow
Lesson #10	10. Tightens bow
Lesson #11	11. Holds first loop in place with assistance
Lesson #12	12. Pulls loop away from hole
Lesson #13	13. Tightens bow
Lesson #14	14. Pitches lace through hole
Lesson #15	15. Tightens bow
Lesson #16	16. Holds first loop in place
Lesson #17	17. Brings lace over fingers
Lesson #18	18. Pitches lace through hole
Lesson #19	19. Tightens bow
Lesson #20	20. Brings lace through teepee
Lesson #21	21. Tightens bow
Lesson #22	22. Tightens bow
Lesson #23	23. Tightens bow
Lesson #24	24. Brings lace through teepee
Lesson #25	25. Tightens bow
Lesson #26	26. Tightens bow
Lesson #27	27. Tightens bow
Lesson #28	28. Tightens bow
Lesson #29	29. Tightens bow
Lesson #30	30. Tightens bow
Lesson #31	31. Tightens bow
Lesson #32	32. Tightens bow
Lesson #33	33. Tightens bow
Lesson #34	34. Tightens bow
Lesson #35	35. Tightens bow
Lesson #36	36. Tightens bow

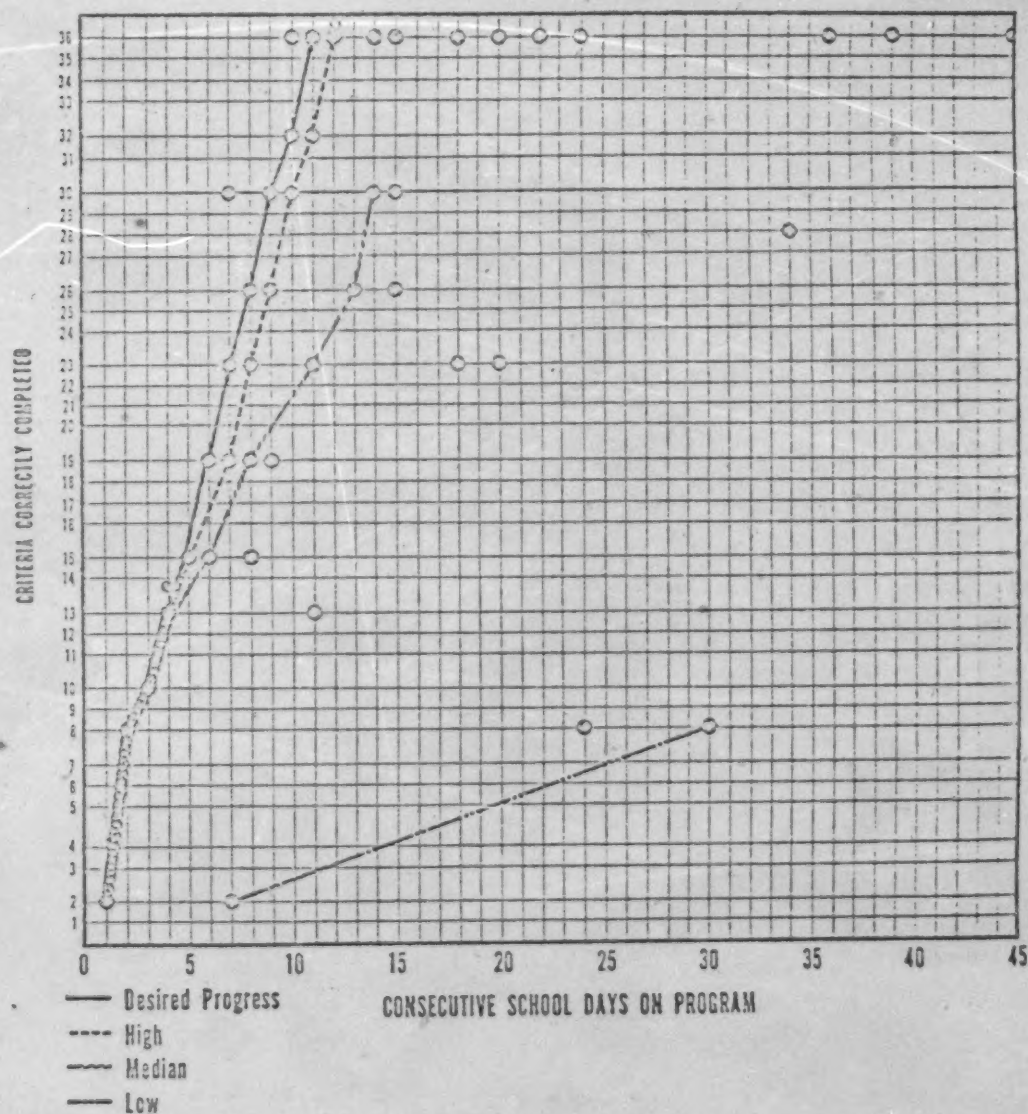


Table 2
NUMBER OF INSTRUCTIONAL DAYS PER STUDENT PER CRITERION TEST.

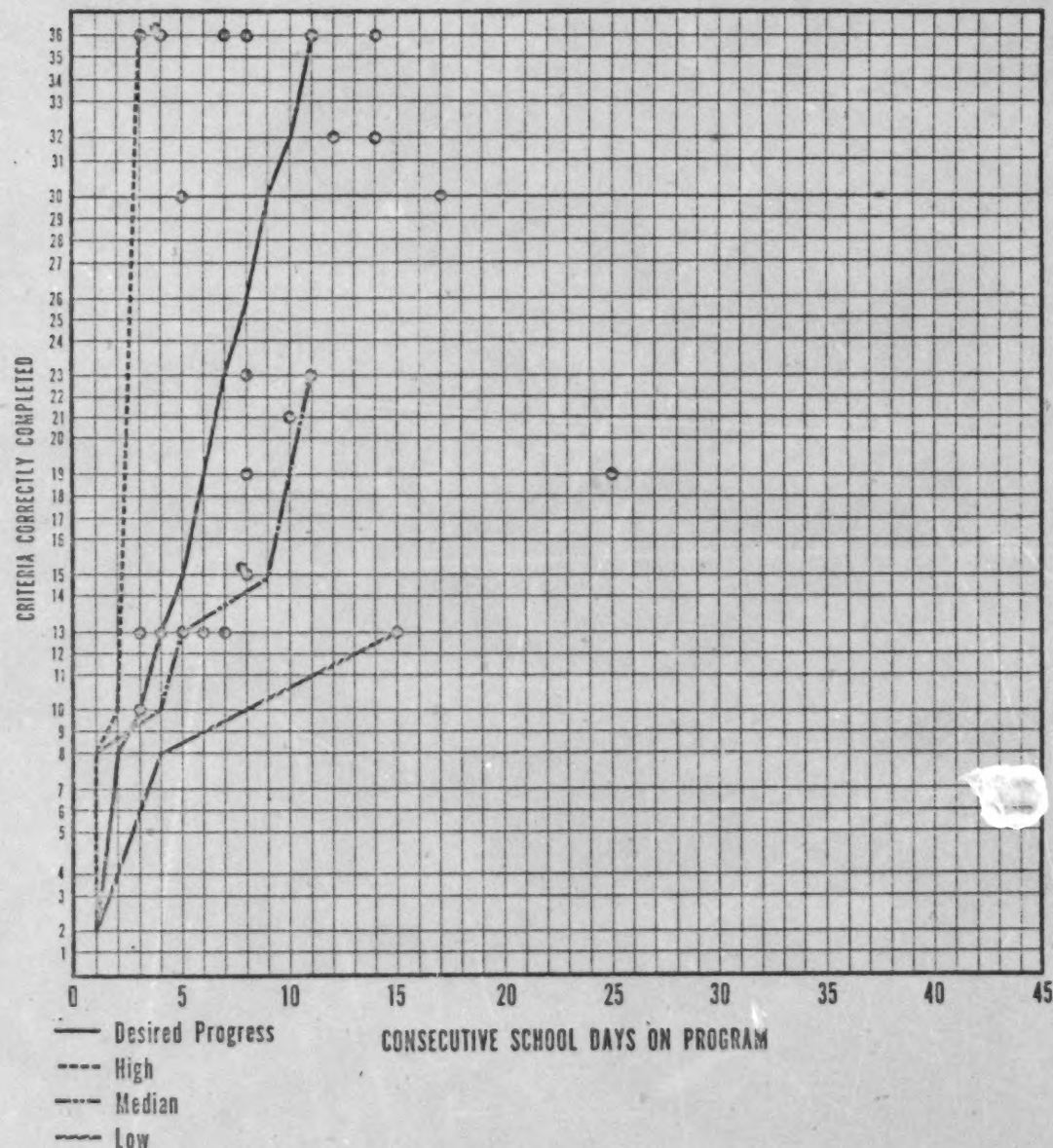
Lesson #	Criteria	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
Lesson #11	26. Ties own shoe	1	1	1	1																					
	25. Ties half knot on own shoe	1	1	1	1																					
	24. Hooks half knot on own shoe	1	1	1	1																					
	23. Ties bow knot on own shoe	1	1	1	1																					
Lesson #12	22. Ties bow knot on own shoe																									
	21. Ties half knot on own shoe																									
Lesson #13	20. Ties bow knot																									
	19. Tightens half knot																									
	18. Brings lace through loops																									
	17. Makes loop																									
Lesson #14	16. Ties the bow knot																									
	15. Tightens half knot																									
	14. Brings lace through loops																									
Lesson #15	13. Tightens bow																									
	12. Pushes lace through hole																									
	11. Brings lace over fingers																									
	10. Makes loop																									
Lesson #16	9. Tightens bow																									
	8. Pushes lace through hole																									
	7. Brings lace over fingers																									
	6. Independently holds first loop in place																									
Lesson #17	5. Tightens bow																									
	4. Pushes lace through hole																									
Lesson #18	3. Tightens bow																									
	2. Pulls loop away from hole																									
	1. Holds first loop in place with assistance																									
Lesson #19	10. Tightens bow																									
	9. Pushes both loops of bow																									
	8. Pulls two loops simultaneously with corresponding hands																									
	7. Pulls loop with "weak" hand																									
	6. Pulls loop with "strong" hand																									
	5. Pushes two loops simultaneously with corresponding hands																									
	4. Pushes loop with "weak" hand																									
	3. Pushes loop with "strong" hand																									
Lesson #20	2. Pushes and releases shoe lace																									
	1. Pushes and releases on verbal command																									

CRITERIA CORRECTLY COMPLETED

STUDENTS ON PROGRAM

RESULTS OF FINAL FIELDTESTING - SHOE TIE PROGRAM

- | | |
|------------|--|
| Lesson #11 | 36. Unties own shoe |
| | 35. Unties half knot on own shoe |
| | 34. Weeks half knot on own shoe |
| | 33. Unties bow knot on own shoe |
| Lesson #10 | 32. Ties bow knot on own shoe |
| | 31. Ties half knot on own shoe |
| Lesson #9 | 30. Ties bow knot |
| | 29. Tightens half knot |
| | 28. Brings lace through teepee |
| | 27. Makes teepee |
| Lesson #8 | 26. Ties the bow knot |
| | 25. Tightens half knot |
| | 24. Brings lace through teepee |
| Lesson #7 | 23. Tightens bow |
| | 22. Pushes lace through hole |
| | 21. Brings lace over fingers |
| | 20. Makes loop |
| Lesson #6 | 19. Tightens bow |
| | 18. Pushes lace through hole |
| | 17. Brings lace over fingers |
| | 16. Independently holds first loop in place |
| Lesson #5 | 15. Tightens bow |
| | 14. Pushes lace through hole |
| Lesson #4 | 13. Tightens bow |
| | 12. Pulls loop away from hole |
| | 11. Holds first loop in place with assistance |
| Lesson #3 | 10. Tightens bow |
| | 9. Pinches both loops of bow |
| Lesson #2 | 8. Pulls two loops simultaneously with corresponding hands |
| | 7. Pulls loop with "weak" hand |
| | 6. Pulls loop with "strong" hand |
| | 5. Pinches two loops simultaneously with corresponding hands |
| | 4. Pinches loop with "weak" hand |
| | 3. Pinches loop with "strong" hand |
| Lesson #1 | 2. Pinches and releases shoe lace |
| | 1. Pinches and releases on verbal command |



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Table 6

Results of Secondary Fieldtesting - Let's Tell Time Program

Lesson	HD-1	HD-2	HD-3	H-1	H-2	H-3	H-4	H-5	H-6	M-1	M-2	M-3	M-4	M-5	M-6	M-7	M-8	M-9	M-10	M-11
Number of students who scored above 90%	17	23	23	22	14	20	15	24	19	21	20	13	18	21	16	19	19	17	10	20
Number of students who scored below 90%	7	2	2	4	12	6	11	2	7	5	6	12	6	4	8	5	3	6	13	3
Last lesson											1				1	1				
Lessons in need of revision					*		*					*							*	

Lesson	M-12	M-13	M-14	M-15	M-16	M-17	M-18	M-19	M-20	T-1	T-2	T-3	T-4	T-5	T-6	GM-1	GM-2	GM-3	GM-4	GM-5
Number of students who scored above 90%	21	18	19	17	18	14	6	6	10	15	9	10	13	14	12	7	12	11	10	12
Number of students who scored below 90%	2	3	2	4	3	7	15	14	10	5	11	10	7	6	8	13	8	9	10	7
Last lesson	2						1											1		
Lessons in need of revision							*	*	*		*	*				*	*	*	*	

Number of Subjects - 26

Number of students who could tell time after completing the program: 12

Table 7

Results of Secondary Fieldtesting: Ruler Measurement Program

Lesson	1	2	3	4	5	6	CRT 1	7	8	9	10	11	12	13	14	15	CRT 2	16	17	18	19	20
Number of students who scored above 90%	12	11	11	12	12	10	12	20	20	19	17	19	19	19	18	17	17	17	16	15	16	15
Number of students who scored below 90%		1	1			2				1	1				1	1	1	1	1	2		1
Last Lesson										1					1			1		1		
Lessons in need of revision																						

Lesson	21	22	CRT 3	23	24	25	26	CRT 4	27	CRT 5	28	29	30	CRT 6	31	32	CRT 7	33	34	35	36	CRT 8
Number of students who scored above 90%	16	15	13	14	14	13	11	9	9	10	10	6	6	1	1	1	1	1	1	1	1	1
Number of students who scored below 90%		1	2																			
Last lesson		1	1		1	2	1				2	2	5									
Lessons in need of revision													*									

Number of Subjects - 20

PROTOTYPE MODEL FOR INSTRUCTIONAL MATERIAL DEVELOPMENT



Figure 1

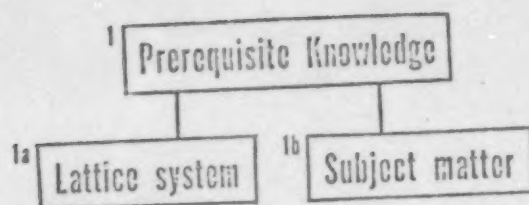


Figure 3

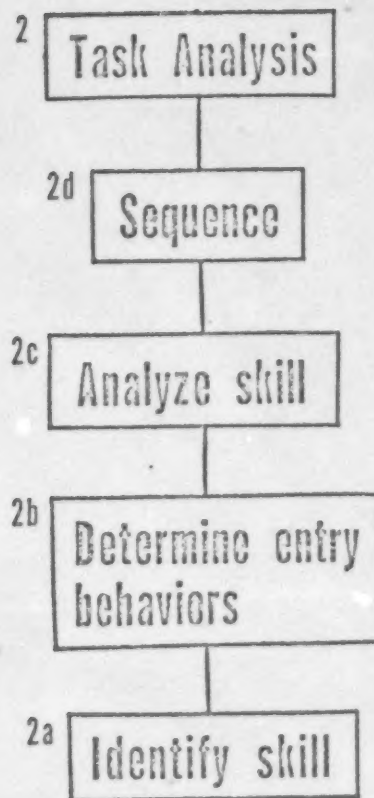


Figure 4

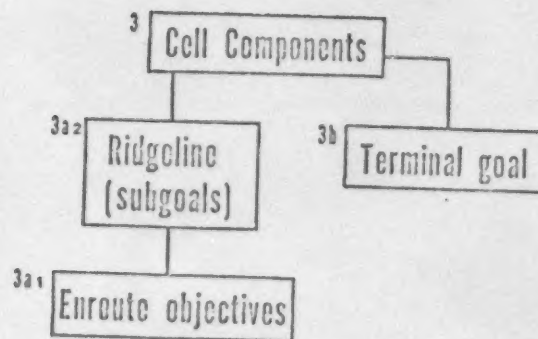


Figure 5

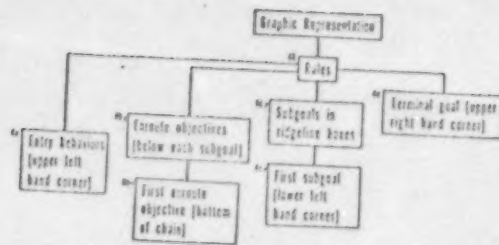


Figure 6

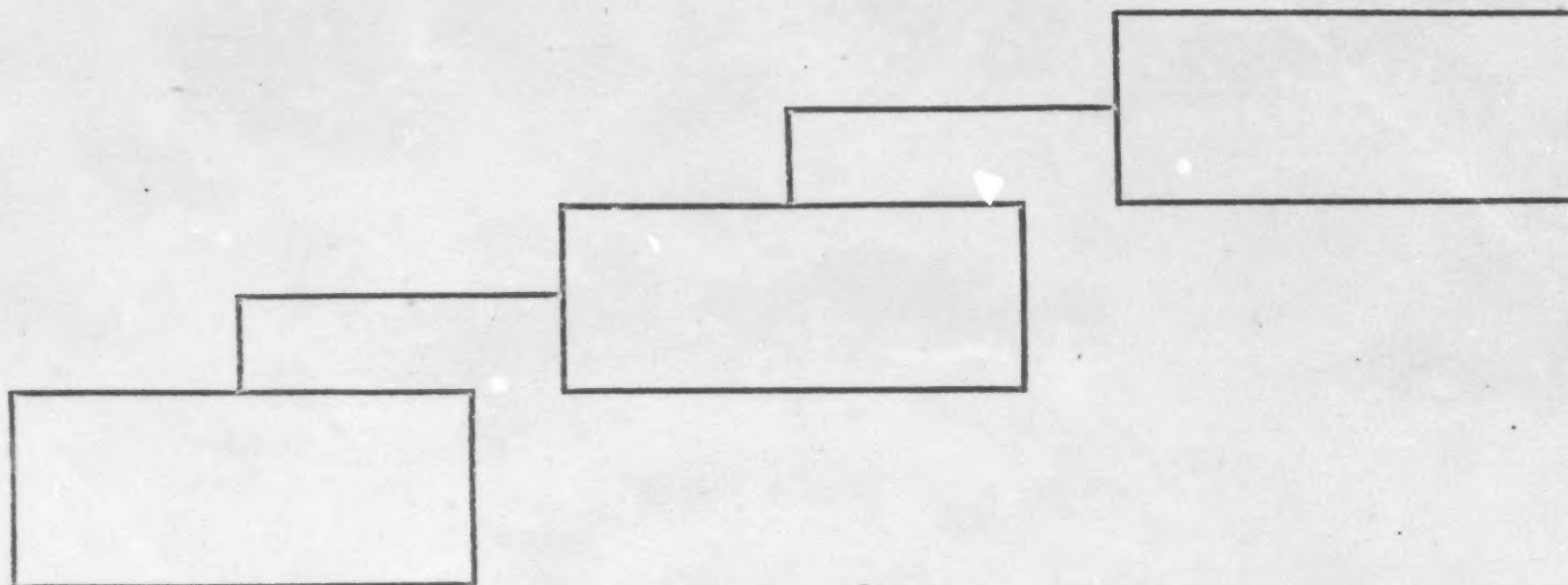


Figure 7

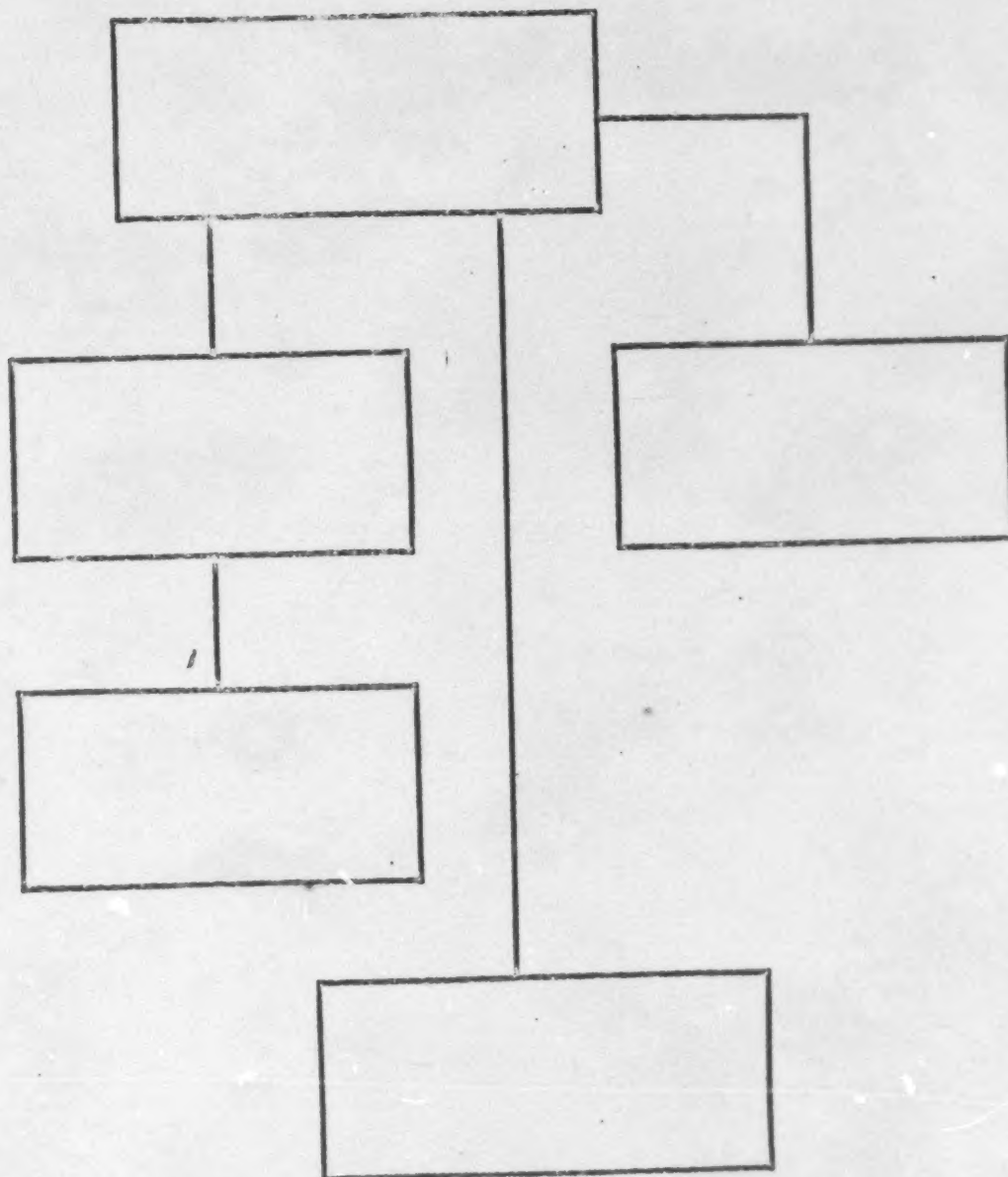


Figure 8

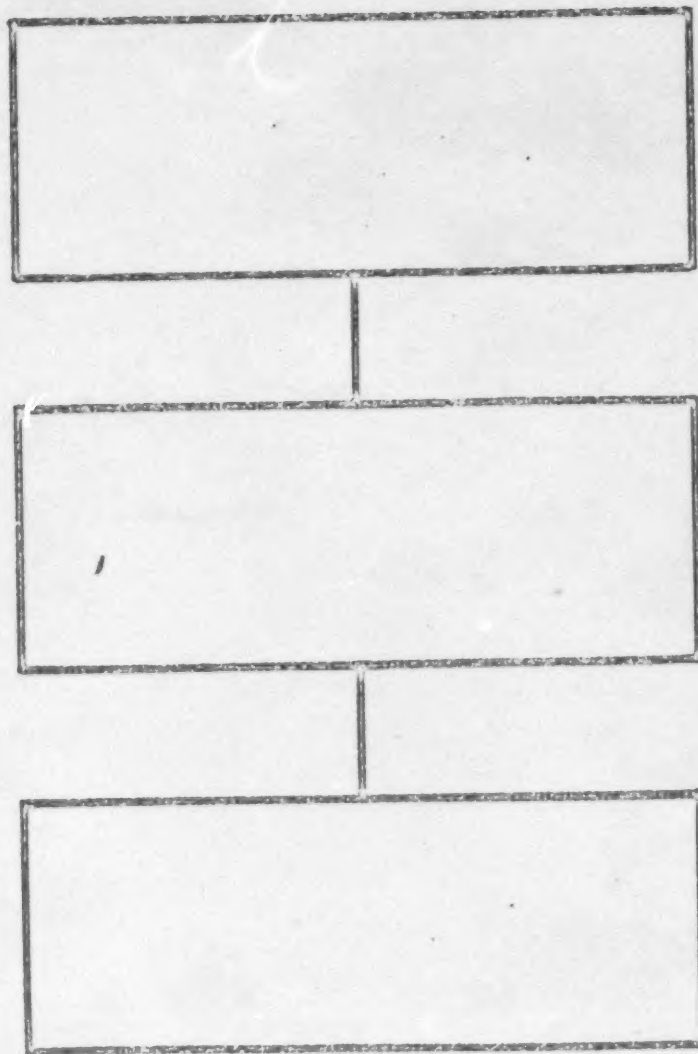


Figure 9

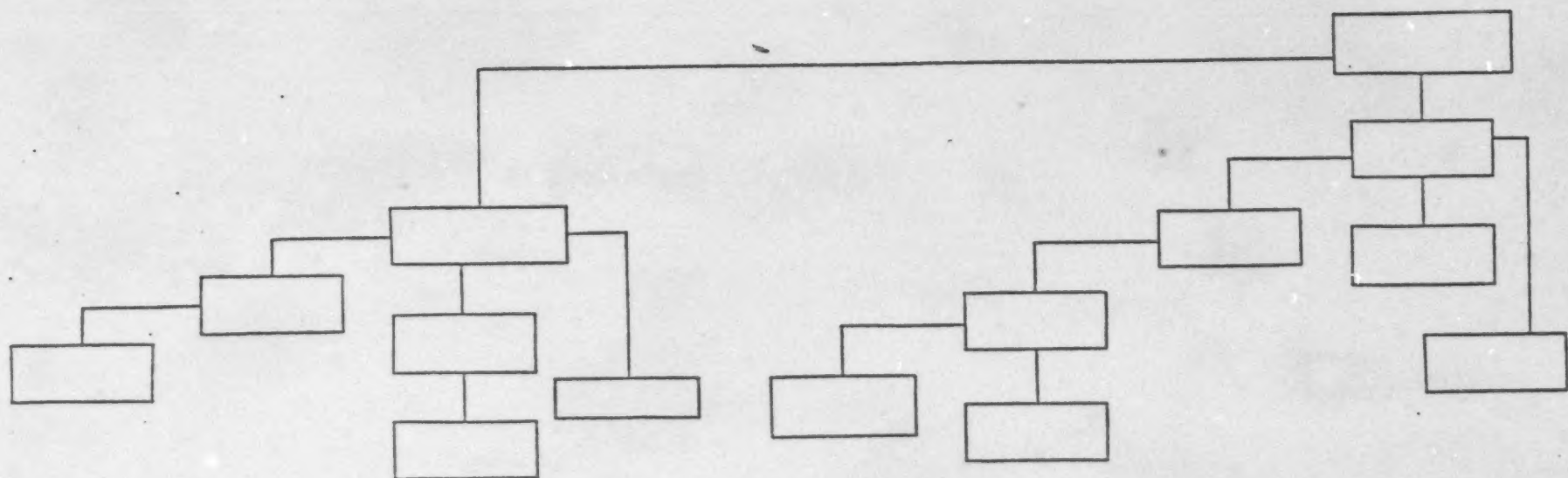


Figure 10

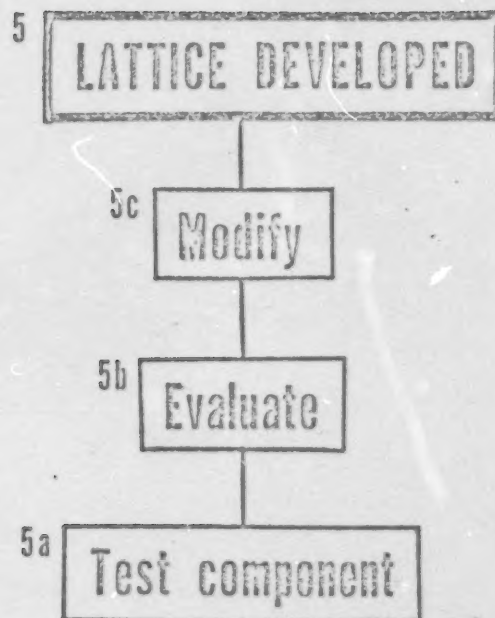


Figure 11

Lattice for SHOES TIED

Entry Behaviors

Imitate or model others
Can grasp
Pull against tension

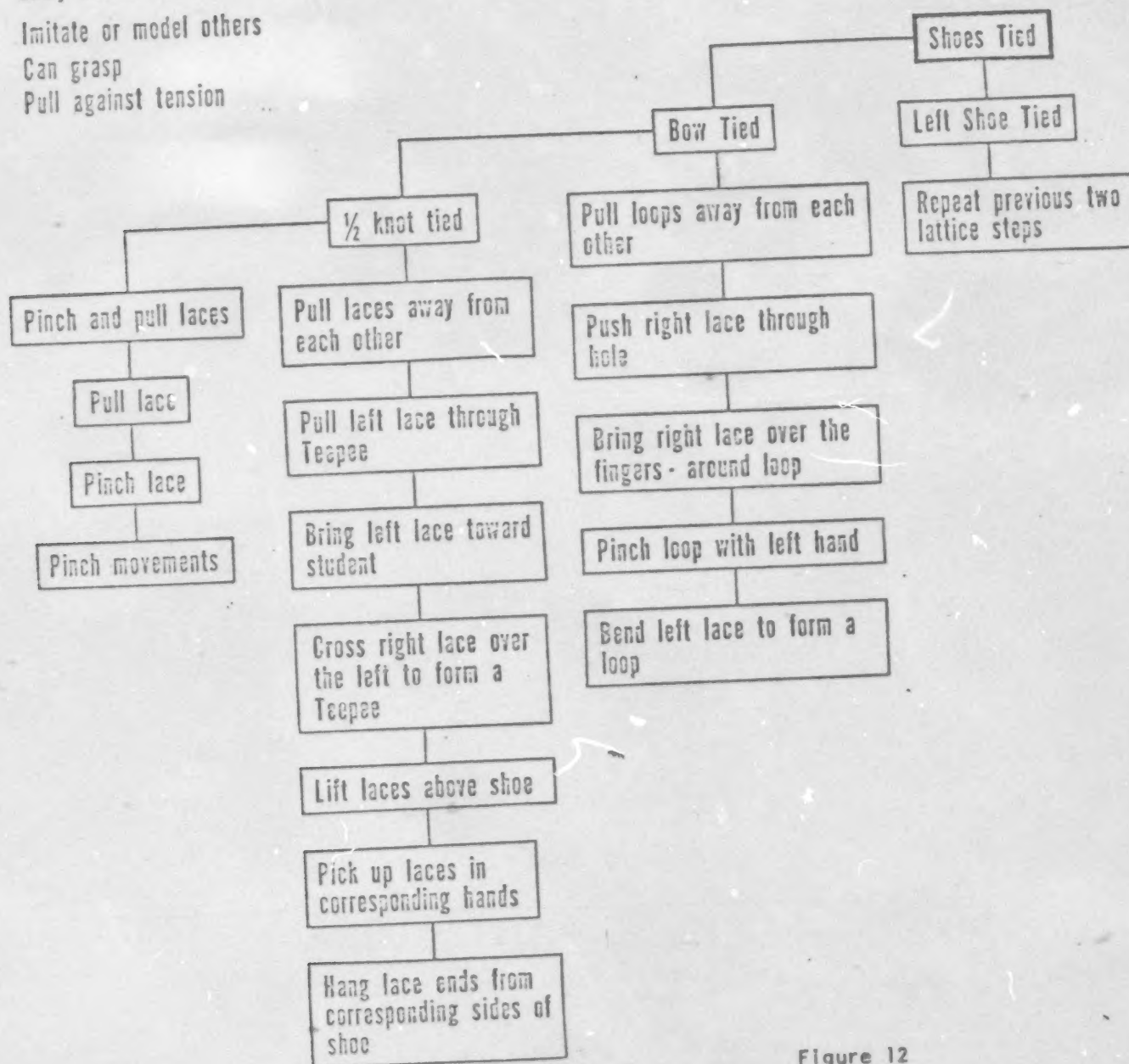


Figure 12

Say: THIS IS CALLED A BOW. WHAT IS THIS CALLED? (R-3)

R-3. "Bow"

Section 2: Student Pulls Bow Tight

Untie the shoe. Tie the laces slowly, stopping at the step where you pull the loops to finish the bow.

Say: YOU PINCH THE LOOPS. MAKE SURE YOU PINCH BOTH PARTS AT ONCE. (R-4)

R-4. Pinches loops.

If child hooks loops, say: NO. Then model the pinching movements in the air.

Say: PINCH

Have students imitate pinching three times correctly in the air

NOW IT'S YOUR TURN TO PULL THE BOW TIGHT. PULL THE LOOPS AWAY FROM EACH OTHER. (R-5)

R-5. Pulls loops away from each other.

Repeat Section 2 until the student correctly completes the task three consecutive times.

Repeats Section 2 three times correctly.

Figure 13

Entry Behaviors

Grasp motion
Turn motion
Counts from 1 to 12
Precise use of pencil
Identification of a ruler
Concept of top and bottom
Division of 12 by 2,4,8

Uses Ruler

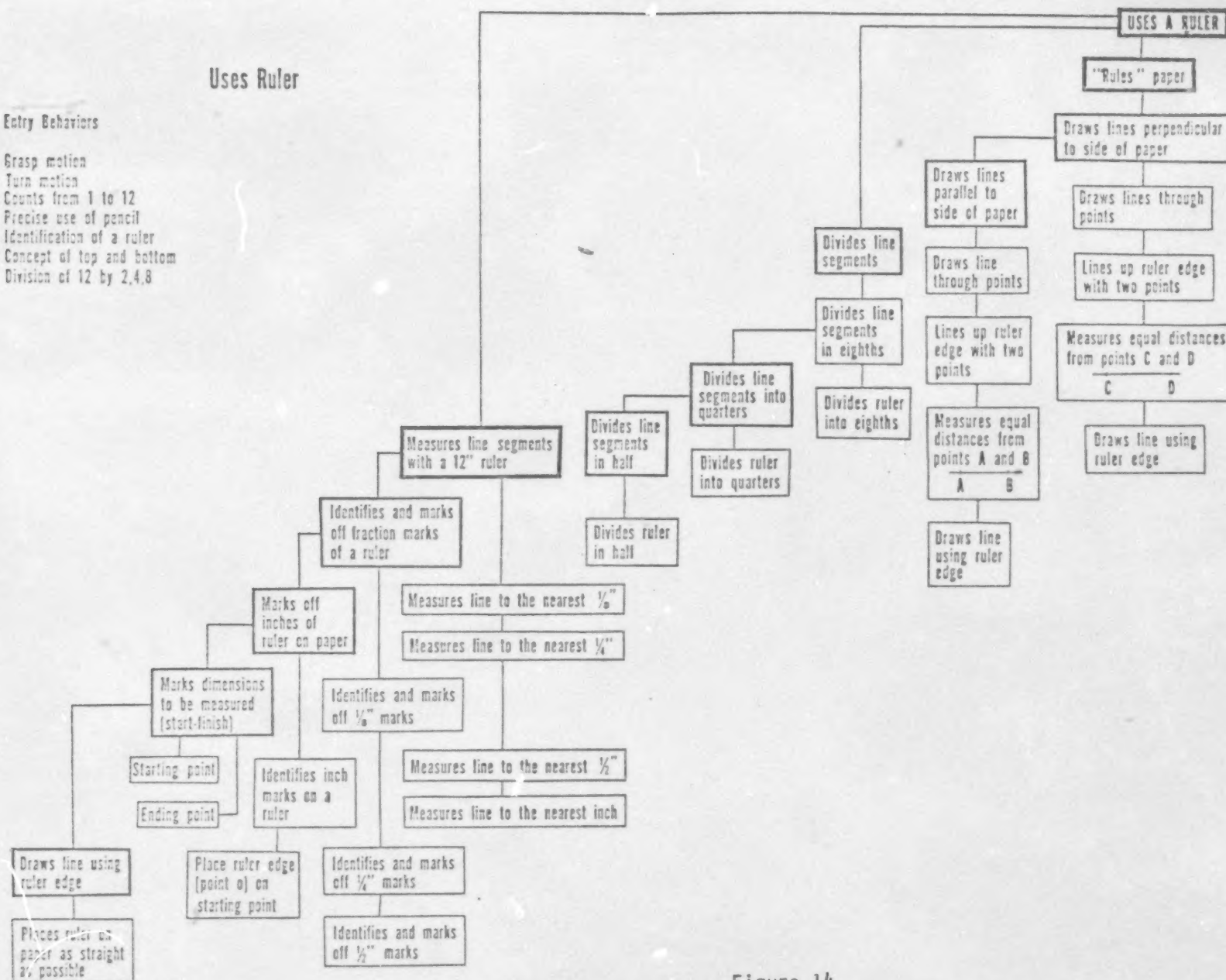


Figure 14

Entry Behaviors
 Number recognition 1:50
 Size count 1:50
 Write numbers sequentially 1:50
 Count by 5's to 50
 Count by 10's to 50
 Discriminate between red and black

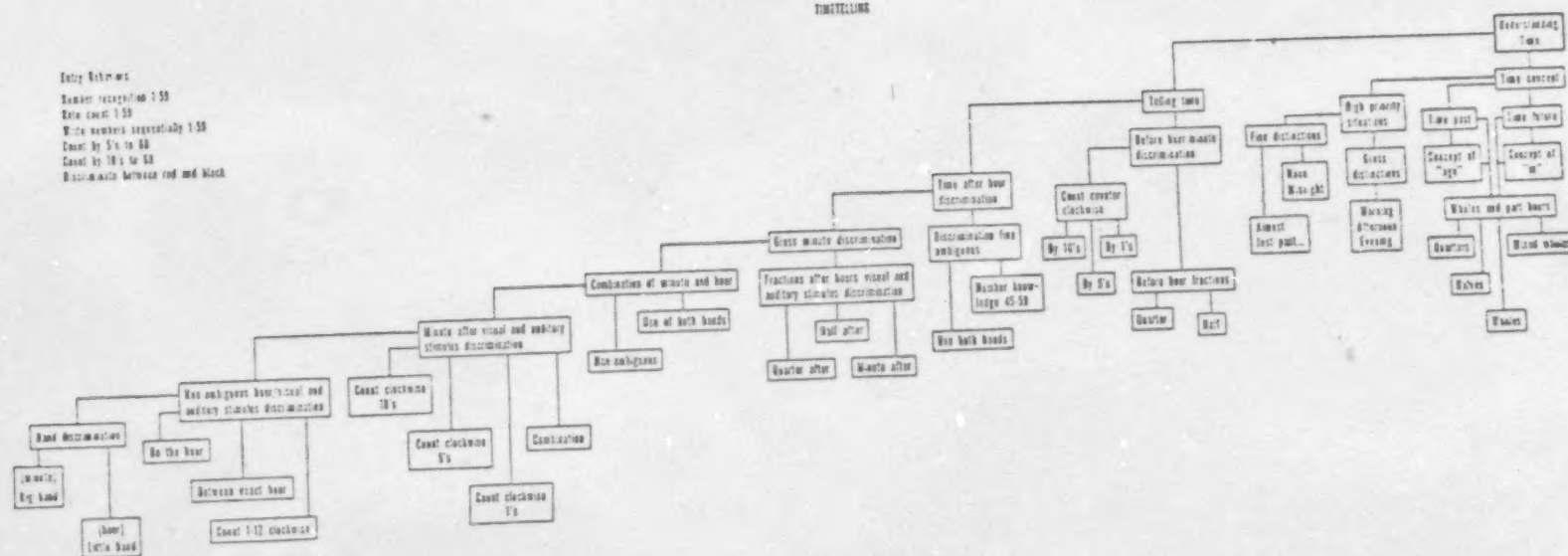


Figure 15

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Smith, D. D., Smith, J. O., Snyder, L. K., & Maser, J. T. Research and application of instructional materials development. In N. G. Haring (Ed.), A program project for the investigation and application of procedures of analysis and modification of behavior of handicapped children. Annual Report No. 2, July, 1974, Experimental Education Unit, Child Development and Mental Retardation Center, University of Washington, Project No. 572247, OEG-0-70-3916(607), National Institute of Education.

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Woolman, M. The concept of the program lattice. Washington, D. C.: Institute of Educational Research, Inc., 1962.

PART III

Attachment 1

DISSEMINATION STATUS REQUEST

Data collected through this form will be used as management information by the School Practice and Service staff to highlight and summarize the outcomes of projects supervised or funded by NIE^{*} and to facilitate our FY 76 planning. Projects which contributed to the growth of knowledge should describe the types of knowledge generated, the major findings, and anecdotal examples of impact on educational research, policy, or practice (see Section 3, "Knowledge Outcomes"). If the project produced products, a longer format for reporting data has been provided (see Section 4, "Practitioner Products"). If multiple products were developed by a project, status information should be provided for each product separately.

We need this information on every NIE-sponsored product, regardless of its stage of development, unless the product has been completely dropped and is no longer regarded as viable by the developer.

The following outline contains the items of information needed:

1. Official Project Title: A PROGRAM PROJECT FOR THE INVESTIGATION AND APPLICATION OF PROCEDURES OF ANALYSIS AND MODIFICATION OF BEHAVIOR OF HANDICAPPED CHILDREN - Team 1
2. Contract/Grant No.: OEG-0-70-3916
3. Knowledge Outcomes (theories, research conclusions, etc.: complete only if there were such outcomes)

- A. Give the number of reports, articles, books, speeches, etc. generated by the project (either during the project or subsequently). A bibliography of published articles would be welcomed in addition.

<u>15</u>	Articles in professional journals
<u>--</u>	Articles in popular news media
<u>24</u>	Articles or chapters in books
<u>1</u>	Books
<u>33</u>	Presentations at professional conventions
<u>10</u>	Other (please describe) Workshops - Inservice

(Bibliography attached)

- B. In a few brief sentences describe the major conclusions or findings that have emerged from your work:

(See attached)

- C. Give one or two anecdotal examples of the impact your NIE-sponsored work has had on educational research, policy, or practice, including any indication of use that you or others have made of your findings (additional research, modification of educational practice, etc.). (Please type this material on a separate page and attach.)

(See attached)

*Include OE or OEO projects transferred to NIE.

TEAM I:
PUBLICATIONS

- Lovitt, T. C. Exceptional Children, Guest Editor, Behavior Modification, 37, 1970.
- Lovitt, T. C. Behavior modification: The current scene. Exceptional Children, 1970, 37, 85-91.
- Lovitt, T. C. Behavior modification: The current scene. In R. J. Taggart and C. D. Marler (Eds.), Educational issues for humanistic analysis. New York: Simon and Schuster, Inc., 1972, Pp. 193-199.
- Lovitt, T. C. Behavior modification: The current scene. In A. R. Brown (Ed.), Modifying children's behavior. Springfield, Illinois: Charles C. Thomas Publishers, in press.
- Lovitt, T. C. Behavior modification: Where do we go from here? Exceptional Children, 1970, 37, 157-167.
- Lovitt, T. C., Schaaf, M. E., & Sayre, E. The use of direct and continuous measurement to evaluate reading materials and procedures. Focus on Exceptional Children, 1970, 2, 1-11.
- Lovitt, T. C., Schaaf, M. E., & Sayre, E. The use of direct and continuous measurement to evaluate reading materials and procedures. In E. L. Meyen, G. A. Vergason, and R. J. Whelan (Eds.), Strategies for teaching exceptional children. Denver: Love Publishing Company, 1972, Pp. 415-432.
- Lovitt, T. C., Schaff, M. E., & Sayre, E. The use of direct and continuous measurement to evaluate reading materials and procedures. In E. L. Meyen, G. A. Vergason, and R. J. Whelan (Eds.), Alternatives for teaching exceptional children. Denver: Love Publishing Company, in press.
- Lovitt, T. C. & Esveldt, K. A. The relative effects on math performance of single- versus multiple-ratio schedules: A case study. Journal of Applied Behavior Analysis, 1970, 3, 261-270.
- Lovitt, T. C. & Esveldt, K. A. The relative effects on math performance of single- versus multiple-ratio schedules: A case study. In R. D. Olson, R. K. Smith, and G. A. Olson (Eds.), Learning in the classroom. Berkeley: McCutchan Publishing Corporation, 1971, Pp. 207-222.
- Lovitt, T. C. & Esveldt, K. A. The relative effects on math performance of single- versus multiple-ratio schedules: A case study. In O. I. Lovaas and B. D. Bucher (Eds.), Perspectives in behavior modification with deviant children. Englewood Cliffs, New Jersey: Prentice-Hall, Inc., 1974, Pp. 372-388.

- Lovitt, T. C. & Esveltdt, K. A. The relative effects on math performance of single- versus multiple-ratio schedules: A case study. In H. M. Walker and N. K. Buckley (Eds.), Token reinforcement techniques. Eugene, Oregon: E-B Press, A Division of Engelmann-Becker Corporation, 1974, Pp. 132-133 (condensed).
- Lovitt, T. C. & Kidder, J. D. Experimental analysis of children with learning disabilities. In R. Jones (Ed.), New directions in special education. Boston: Allyn and Bacon, 1971, Pp. 234-242.
- Lovitt, T. C., Eaton, M., Kirkwood, M. E., & Pelander, J. Effects of various reinforcement contingencies on oral reading rate. In E. A. Ramp and B. L. Hopkins (Eds.), A new direction for education: Behavior analysis. Lawrence, Kansas: Department of Human Development, 1971, Pp. 54-71.
- Lovitt, T. C. & Esveltdt, K. A. A contingency management classroom: Basis for systematic replication (four studies). In N. G. Haring and A. H. Hayden (Eds.), The improvement of instruction. Seattle: Special Child Publications, 1972, Pp. 311-368.
- Lovitt, T. C. Precision teaching: A system for classroom evaluation. In R. P. Sexton and C. P. Fox (Eds.), New organizational patterns and delivery systems. Eugene, Oregon: University of Oregon, School of Education, Department of Special Education, 1972, Pp. 113-126.
- Lovitt, T. C. & Smith, J. O. Effects of instructions on an individual's verbal behavior. Exceptional Children, 1972, 38, 685-693.
- Eaton, M. & Lovitt, T. C. Achievement tests vs. direct and daily measurement. In G. Semb (Ed.), Behavior analysis and education - 1972. Lawrence, Kansas: University of Kansas Press, 1972, Pp. 78-87.
- Smith, D. D., Lovitt, T. C., & Kidder, J. D. Using reinforcement contingencies and teaching aids to alter subtraction performance of children with learning disabilities. In G. Semb (Ed.), Behavior analysis and education - 1972. Lawrence, Kansas: University of Kansas Press, 1972, Pp. 342-360.
- Smith, D. D., Lovitt, T. C., & Kidder, J. D. Using reinforcement contingencies and teaching aids to alter subtraction performance of children with learning disabilities. In T. C. Lovitt, and N. G. Haring (Eds.), Precision teaching at the Experimental Education Unit, in press.
- Haring, N. G. & Lovitt, T. C. Experimental education: Basis for strategies of service, research and training. In M. B. Rosenberg (Ed.), Educational therapy (Vol. III). Educational programs. Seattle: Bernie Straub Publishing Company, Inc. and Special Child Publications, 1973, Pp. 121-143.
- Smith, D. D. & Lovitt, T. C. The educational diagnosis and remediation of b and d written reversal problems: A case study. Journal of Learning Disabilities, 1973, 6, 356-363.

- Smith, J. D. & Lovitt, T. C. Pinpointing a learning problem leads to remediation. Teaching Exceptional Children, 1973, 5, 181-182.
- Lovitt, T. C. Self-management projects with children with behavioral disabilities. Journal of Learning Disabilities, 1973, 6, 138-150.
- Lovitt, T. C. Self-management projects with children with behavioral disabilities. In H. Dupont (Ed.), Educating emotionally disturbed children: Readings (Second Edition). New York: Holt, Rinehart and Winston, Inc., in press.
- Lovitt, T. C. Self-management projects with children with behavioral disabilities. In A. M. Graziano and M. A. O'Mara (Eds.), Behavior therapy with children (Vol. II). Chicago: Aldine Publishing Company, in press.
- Lovitt, T. C., Lovitt, A. D., Eaton, M., & Kirkwood, M. The deceleration of inappropriate comments by a natural consequence. Journal of School Psychology, 1973, 11, 149-154.
- Lovitt, T. C., Smith, D. D., Kidder, J. D., & Evison, R. Using arranged and programmed events to alter subtraction performance of children with learning disabilities. In F. S. Keller and E. Ribes-Inesta (Eds.), Behavior modification: Applications to education. New York: Academic Press, Inc., 1974, Pp. 27-62.
- Lovitt, T. C. & Hurlbut, M. Using behavior-analysis techniques to assess the relationship between phonics instruction and oral reading. Journal of Special Education, 1974, 8(1), 57-72.
- Lovitt, T. C. & Smith, D. D. Using withdrawal of positive reinforcement to alter subtraction performance. Exceptional Children, 1974, 40, 357-358.
- Smith, D. D. & Lovitt, T. C. The use of modeling techniques to influence the acquisition of computational arithmetic skills in learning disabled children. In E. Ramp and G. Semb (Eds.), Behavior analysis: Areas of research and application. Englewood Cliffs, New Jersey: Prentice-Hall, Inc., in press.
- Lovitt, T. C. & Haring, N. G. (Eds.), Precision teaching at the Experimental Education Unit, in press.
- Appelman, K. I. & Lovitt, T. C. The use of direct-daily measurement techniques to assess the effects of whole-word instruction on spelling and oral reading. In T. C. Lovitt and N. G. Haring (Eds.), Precision teaching at the Experimental Education Unit, in press.
- Gardstrom, M. & Lovitt, T. C. Creative writing rates of second graders: Effects on reading their stories and seeing their performance graphs. In T. C. Lovitt and N. G. Haring (Eds.), Precision teaching at the Experimental Education Unit, in press.

Lovitt, T. C. & Eaton, M. Oh! that this too too solid flesh would melt: Direct and daily measurement hath cometh (The erosion of achievement tests). In N. Bartel and S. Axelrod (Eds.), The handbook for special education research. CEC Publication, in press.

Lovitt, T. C. Applied behavior analysis techniques and curriculum research. In N. G. Haring and R. L. Schiefelbusch (Eds.), Teaching special children. New York: McGraw-Hill, Inc., in press.

Hansen, C. L. & Lovitt, T. C. The relationship between question type and mode of reading on the ability to comprehend. Journal of Special Education, in press.

Hansen, C. L. & Lovitt, T. C. Reading: Round one--Matching the child to the book. In Proceedings of Fifth Annual Conference on Behavior Analysis in Education, University of Kansas, in press.

Lovitt, T. C. & Hansen, C. L. Round one--Placing the child in the right reader. Journal of Learning Disabilities, in press.

Lovitt, T. C. Applied behavior analysis and learning disabilities: Curriculum research recommendations. Journal of Learning Disabilities, in press.

TEAM 1:

ANNOTATED BIBLIOGRAPHY

1. Lovitt, T. C. Exceptional Children, Guest Editor, Behavior Modification, 37, 1970.
2. Lovitt, T. C. Behavior modification: The current scene. Exceptional Children, 1970, 37, 85-91.

This article discusses the growth of academic interest in the training of special educators in behavior modification techniques and the growing diversification of application to new settings, ages and diagnostic categories. The author presents behavior modification as a methodology in which investigators are concerned with individualized treatment regimes, reliable measurement, and discovering events that alter behavior. The article includes appraisal guidelines for judging studies representing different methodologies.

3. Lovitt, T. C. Behavior modification: Where do we go from here. Exceptional Children, 1970, 37, 157-167.

This report describes current trends in the use of behavior modification practices. First, in the next few years, more individuals from those disciplines concerned with the management and treatment of children will begin to use behavior modification techniques. Second, many behavior managers may obtain data to discover the current status of a behavior with no attempt to alter it. Third, there is an increased interest in applying continuous measurement and contingency management to academic performance. The author foresees an interest in measuring a wide range of children's behaviors. This may include simultaneously measuring a number of behaviors to assess side effects of certain variables. The uses of parametric or component analysis in evaluating performance are discussed. Finally a trend toward training children to manage their own behavior is indicated.

4. Lovitt, T. C., Schaaf, M. E., & Sayre, E. The use of direct and continuous measurement to evaluate reading materials and procedures. Focus on Exceptional Children, 1970, 2, 1-11.

This paper discusses direct and daily measurement as a means for evaluation and comparison of reading materials. A case study of an eight-year old boy compared his reading performance in three texts. The study revealed that his performance was similar in all three readers, in spite of the fact that the grade levels and readability indexes of the readers varied. The authors suggest that the pupil is the best assessor of various readers. Although descriptions and categorization schemes, such as grade level equivalence, readability, and interest when used to explain reading matter, are based on some logical dimension such as sentence length, syntax, or content, only the pupil can determine what is "easy" or "difficult."

5. Lovitt, T. C. & Esveldt, K. A. The relative effects on math performance of single- versus multiple-ratio schedules: A case study. Journal of Applied Behavior Analysis, 1970, 3, 261-270.

This series of four experiments sought to assess the comparative effects of multiple-versus single-ratio schedules on a pupil's responding to mathematics materials. Experiment I, which alternated between single- and multiple-ratio contingencies, revealed that during the latter phase the subject responded at a higher rate. Similar findings were revealed by Exp. II. The third experiment, which manipulated frequency of reinforcement rather than multiple ratios, revealed that the alteration had a minimal effect on the subject's response rate. A final experiment, conducted to assess further the effects of multiple ratios, provided data similar to those of Exp. I and II.

6. Lovitt, T. C. & Kidder, J. D. Experimental analysis of children with learning disabilities. In R. Jones (Ed.), New directions in special education. Boston: Allyn and Bacon, 1971, Pp. 234-242.

This article describes the process of an experimental analysis of behavior when applied to the assessment of a learning disabled child. Objective observation, continuous measurement and systematic specification of variables characterize this process. Three stages of behavioral assessment include: initial assessment, manipulation, and acquisition. Initial analysis involves observation of the child in the classroom for a period of time to ascertain his initial level of performance, as well as gathering data relevant to the teacher's general management and verbal behaviors. During the manipulation stage one obtains data relevant to the child's motivation system. During the acquisition stage, one designs academic programs or procedures that can be effectively administered in the public school situation. The procedures, rationale and a case study are included.

7. Lovitt, T. C., Eaton, M., Kirkwood, M. E., & Pelander, J. Effects of various reinforcement contingencies on oral reading rate. In E. A. Ramp and B. L. Hopkins (Eds.), A new direction for education: Behavior analysis. Lawrence, Kansas: Department of Human Development, 1971, Pp. 54-71.

This report includes the data of four experiments. In each study data were obtained for several sessions as students read orally from two readers. One reader served as the experimental text while the other reader was the control. The data in these projects were correct and incorrect words per minute.

In each experiment a different reinforcement contingency was arranged during a certain phase or phases of the experimental reader. In Experiment 1 a combined correct and error rate contingency was scheduled. This contingency specified that if the pupil's correct rate exceeded and error rate was less than prescribed limits, he would be paid off on a 25:1 ratio. In Experiment 2 a withdrawal contingency was scheduled. In that project points were taken away on a 2:1 ratio. In the third project points were granted on a 1:1 ratio; for every correctly read word one point was given. In the fourth experiment a 30:1 ratio was arranged. This contingency was arranged for correct responses.

The data from these projects indicated that oral reading rates are responsive to a variety of reinforcement contingencies. In every instance when the

performance gains of the experimental reader were compared to those of the control reader, the advantage was greater in the former.

8. Lovitt, T. C. & Esveldt, K. A. A contingency management classroom: Basis for systematic replication (four studies). In N. G. Haring and A. H. Hayden (Eds.), The improvement of instruction. Seattle: Special Child Publications, 1972, Pp. 311-368.

This report provides a plan for arranging a classroom where significant research can be carried out. Components of reliable situation include response definition, stable environment, recording responses and establishing reinforcers. Four studies demonstrate systematic replication. They were conducted in a contingency management classroom in which programmed materials were used. Academic responses were recorded on data sheets, and points per answer contingencies were employed--points being redeemable for leisure time activities. The first study compared the respective effects of teacher- and pupil-specified contingency ratios on academic response rates. The second investigation involved a manipulation of the ratio schedules by which reinforcement were delivered. The third study was an assessment of teacher training to determine student instructor efficiency and teacher-training efficiency. The last study assessed the effects on student performance of his verbalizing a math problem prior to making a written response. The findings were as follows:

Study I: For this subject, self-imposed contingencies were associated with an increased academic response rate.

Study II: Multiple ratio conditions should be considered an effective variable when the objective is to accelerate academic response rate.

Study III: Data provide initial evidence that when the product of teaching is measured in terms of pupil performance and teaching procedures are first defined and then taught, a "teacher" can be trained in a relatively short period of time.

Study IV: Findings supported the theory that verbalizing a problem aids in solving it.

9. Lovitt, T. C. Precision teaching: A system for classroom evaluation. In R. P. Sexton and C. P. Fox (Eds.), New organizational patterns and delivery systems. Eugene, Oregon: University of Oregon, School of Education, Department of Special Education, 1972, Pp. 113-126.

This article discusses how the principles of precision teaching offer an alternative approach to measurement--measurement that is direct, frequent, and inexpensive. The author explains how this form of measurement furnishes the teacher with vital information about the way he and his students interact, whether he is or is not successful; examples clarify how this measurement system (1) provides teacher feedback on his own performance, (2) evaluates various instructional techniques and procedures, (3) determines the effects of some contingency or rule on pupil performance, (4) serves school personnel by facilitating communication between the teacher and the administration, and (5) assists teachers to communicate with parents. This article also suggests how the special education director or principal can play an important part in maintaining such a measurement system.

10. Lovitt, T. C. & Smith, J. O. Effects of instructions on an individual's verbal behavior. Exceptional Children, 1972, 38, 685-693.

The pupil in this study was a nine-year-old boy. The measures obtained throughout the study were the correct and incorrect rate of saying sentences, average sentence length, and the ratio of different ways of beginning sentences. The project consisted of four experimental phases and was concerned with the effects of various types of examiner instructions on the three language measures. Throughout the study the pupil was shown picture cards and asked to describe them. In the first phase the student was merely asked to make a sentence about each picture. Throughout the second phase the pupil was instructed to vary the ways in which he began sentences. During the third condition he was told to make longer sentences. No instructions were given in the fourth phase. The data regarding sentence construction showed that his sentences throughout all experimental phases were generally all correct. As to varied sentence beginnings, the ratio was greatly increased in the second phase over the proportion in the first phase. The number of varied beginnings continued to be high in phases 3 and 4. The pupil's mean length of response was much higher in phase 3 than in the two preceding phases. This performance increased in the final phase. In addition to the daily measurements that were taken, pre-posttest data were obtained. Before the study the pupil was asked to describe three picture cards (these cards were not used for the daily measurements). Later, he was again asked to respond to the three picture cards and, in addition, to three new cards. These data indicated that he used considerably more words during the posttest than during the pre-test.

11. Eaton, M. & Lovitt, T. C. Achievement tests vs. direct and daily measurement. In G. Semb (Ed.), Behavior analysis and education - 1972. Lawrence, Kansas: University of Kansas Press, 1972, Pp. 78-87.

In this paper the use of achievement test scores for the purposes of placement, communication and evaluation was questioned. Direct and continuous measurement was supported as an alternative method of assessing performance. In order to make comparisons, achievement test scores and direct and daily measurement were obtained from 13 children over a two-year period. In this report both sets of data, from three pupils, are described in order to compare the two systems. The data illustrate how direct and continuous measurement can be used as an instructional tool and gives valuable information for reading remediation.

12. Smith, D. D., Lovitt, T. C., & Kidder, J. D. Using reinforcement contingencies and teaching aids to alter subtraction performance of children with learning disabilities. In G. Semb (Ed.), Behavior analysis and education - 1972. Lawrence, Kansas: University of Kansas Press, 1972. Pp. 342-360.

The procedures used by teachers to change the mathematics behaviors of pupils are either contingently or non-contingently associated with the responses of children. Two projects are described in this report. Both deal with the subtraction performance of learning disabled children. The pupil in Project I was 11; the student in Project II was 10.

In the first project a contingency was scheduled that positively influenced subtraction performance. During certain phases, a withdrawal of reinforcement contingency was imposed--minutes of recess time were taken away contingent on incorrect answers. A multiple baseline design was used.

In the second project a series of non-contingent events altered subtraction performance. During some conditions of the study traditionally used teaching aids--paper clips, abacus, cuisinare rods--were used by the pupil to assist in computing subtraction facts. In Project II a series of "ABA" designs were used.

13. Haring N. G. & Lovitt, T. C. Experimental education: Basis for strategies of service, research and training. In M. B. Rosenberg (Ed.), Educational therapy (Vol. II). Educational programs. Seattle: Bernie Straub Publishing Company, Inc. and Special Child Publication, 1973; Pp. 121-143.

This report describes the three basic strategies of experimental education --service, research, and training--as exemplified by the Experimental Education Unit of the University of Washington. Although the dimensions of these strategies are not rigidly defined and in many instances overlap, certain administrative parameters are apparent. Service refers to the designing of procedures for the current population of school children and the extension of these procedures to field settings. Research is characterized by the exploration of future teaching techniques and methods. Training attempts to extend the scientific elements of diagnosis and remediation throughout a wide community of therapists and to discover those variables relevant to the process of instruction. This report includes various studies and examples of incorporating the scientific principles of direct observation, repeated measurement, and systematic manipulation of variables as applied to the strategies of experimental education.

14. Smith, D. D. & Lovitt, T. C. The educational diagnosis and remediation of b and d written reversal problems: A case study. Journal of Learning Disabilities, 1973, 6, 356-363.

This study reports the educational diagnosis, remediation, and followup of one child's writing reversal problem. By precisely examining the student's academic work, the experimenter discovered that his reversals were not pervasive but rather specific to two letters (b and d) in particular positions. Remediation tactics focused on the most frequent error: the initial d. Once this was corrected, there was no need to remediate written d in different positions or b in any position. In order to determine whether the learning of b and d carried over to other situations, two different conditions were presented to the child. Again, there was no need to remediate written b or d. A post-hoc analysis of this boy's writing revealed that for the remaining eight months of school he maintained a high rate of correctness (99%) in writing b and d.

15. Smith, J. O. & Lovitt, T. C. Pinpointing a learning problem leads to remediation. Teaching Exceptional Children, 1973, 5, 181-182.

This paper indicates how, by detecting a specific problem and finding a specific method to solve it, one successfully remediated math performance in a 10 year old boy labeled "learning disabled". This boy could add in a vertical form, but when the problems were presented in a horizontal form, he consistently made the same type of errors. Through the use of a rotation process and visual cue marks, the boy learned to add in a horizontal format. The improved performance maintained after the cue marks were removed.

16. Lovitt, T. C. Self-management projects with children with behavioral disabilities. Journal of Learning Disabilities, 1973, 6, 138-150.

This report includes seven projects; each is concerned with one or more components of self-management. (1) A pupil was instructed to self-schedule, -correct and -chart. He was also allowed to specify his own contingencies. Throughout the study data were obtained regarding his performance in several academic subjects. (2) Data were obtained in math and reading. During some periods the teacher selected which subject should be initially scheduled; at other times the pupil selected the order. Data from the two conditions were compared. (3) Data were gathered with self-scheduling as a contingency: a pupil worked in a phonics program during conditions when (a) the teacher scheduled the subjects and (b) the pupil could earn the privilege of scheduling. (4) and (5) involved self-recording of troublesome behaviors. During the first condition of these projects the teacher recorded the behaviors, while during the second condition the pupils recorded their own behaviors. Data between conditions were compared. (6) The self-specification of contingencies was assessed. During certain conditions the teacher specified the contingencies; whereas this responsibility was assumed by the pupil at other times. The data from the two conditions were compared. (7) A group of students were taught to self-correct, -count, -time, -chart, and evaluate. Throughout the project data were kept regarding their performances in reading.

17. Lovitt, T. C., Lovitt, A. O., Eaton, M., & Kirkwood, M. The deceleration of inappropriate comments by a natural consequence. Journal of School Psychology, 1973, 11, 149-154.

The characters of this study were two boys in a class for pupils with learning disabilities. The subject was a nine-year-old boy who emitted certain inappropriate comments in class. The manager throughout this study was a peer of the subject.

Following a period of initial assessment, which revealed that the inappropriate verbalizations occurred about twice each day, the peer-manager, contingent on each inappropriate remark, moved away from the subject to another desk. Furthermore, before he moved, he explained to the subject why he was displeased. The peer-manager, after a period of time, returned to his original location contingent on appropriate verbalizations of the subject.

This technique proved effective in that the subject rarely responded inappropriately throughout the remainder of the school term. Further, it was

reported that follow-up observations taken the next year, when the pupil was in a different class, revealed that the inappropriate verbalizations had not reoccurred.

18. Lovitt, T. C., Smith, D. D., Kidder, J. D., & Evison, R. Using arranged and programmed events to alter subtraction performance of children with learning disabilities. In F. S. Keller and E. Ribes-Inesta (Eds.), Behavior modification: Applications to education. New York: Academic Press, Inc., 1974, Pp. 27-62.

Two studies using arranged and programmed events to alter subtraction performance are presented. The first study demonstrates that an arranged event, contingent loss of free-time for errors, can influence a pupil's rate and accuracy of responding. The subject was an eleven year old girl with reading problems. By contrast, the second project illustrates how programmed events in the form of instructional aids can positively alter rate and accuracy of answering problems. The subject of this study was a ten year old boy with academic deficits. Both studies were conducted in the curriculum research classroom at the Experimental Education Unit, University of Washington. This research suggests some pupil behaviors to consider in deciding whether to use a programmed or arranged event and whether to establish a noncontingent or contingent relationship.

19. Lovitt, T. C. & Hurlbut, M. Using behavior-analysis techniques to assess the relationship between phonics instruction and oral reading. Journal of Special Education, 1974, 8(1), 57-72.

Two studies are presented which evaluate the relationship between phonic instruction and oral reading. In the first study the effects of phonics instruction on reading orally from two readers, one based on phonics the other not, was assessed. The subject was a ten year old boy labeled "dyslexic" according to the Slingerland reading test. The second study investigated the effects of two types of phonics instruction on oral reading from a phonics based text. The subjects were four 9 year old boys described as slow readers. Behavior analysis techniques were used. Three rather important findings came from these studies: (a) when phonics skills were precisely defined and when instruction was directed toward them, those skills were improved; (b) when phonics skills improved, so did oral reading; (c) more improvement was noted as the pupil read from the phonics reader than from the non-phonics reader.

20. Lovitt, T. C. & Smith, D. D. Using withdrawal of positive reinforcement to alter subtraction performance. Exceptional Children, 1974, 40, 357-358.

The subject of this study was an eleven-year-old girl classified as learning disabled. Throughout the study the student completed subtraction problems of three classes. Her initial accuracy on all classes was very low. Following the baseline phase a withdrawal of positive reinforcement contingency (minutes of recess time) was associated with first one class of problems then

the others. After the contingency was in effect for all three classes of problems, the contingency was removed from two of the classes. The results indicated that the contingency had an immediate affect on all classes of problems, but no generalization occurred. When the contingency was removed, accurate performance maintained.

21. Smith, D. D. & Lovitt, T. C. The use of modeling techniques to influence the acquisition of computational arithmetic skills in learning disabled children. In E. Ramp and G. Semb (Eds.), Behavior analysis: Areas of research and application. Englewood Cliffs, New Jersey: Prentice-Hall, Inc., in press.

This research indicated that modeling techniques can positively change arithmetic performance. The intervention was a teacher demonstration plus a sample problem which was provided as a referent for the child. Seven children participated in this research; initially, none of them could compute with accuracy any of the arithmetic problems presented to them.

Three studies were conducted. In the first, a Demonstration Plus Permanent Model intervention was scheduled after the baseline period. Six students participated in this study. On the average, their scores rose from 0% to over 96%, and remained at a high level when the intervention was withdrawn.

The second study was a replication of the first. After the baseline period, a feedback tactic was used. This tactic did not alter the children's performance. The Demonstration Plus Permanent Model intervention was again instituted. This caused an immediate rise in performance; on the average, from 0% to 100%.

In the third study, the Demonstration and the Permanent Model components were separated to determine the discrete functions of either. For one child, the Permanent Model alone produced acquisition of an arithmetic skill. For the other two children, the Demonstration alone proved to be effective. In all of the studies, an ABA design was used. Within and across class generalization was also monitored.

22. Lovitt, T. C. & Haring, H. G. (Eds.), Precision teaching at the Experimental Education Unit, in press.

This is a collection of projects conducted at the Experimental Education Unit, University of Washington. They exemplify precision teaching strategies and procedures.

23. Appelman, K. I. & Lovitt, T. C. The use of direct-daily measurement techniques to assess the effects of whole-word instruction on spelling and oral reading. In T. C. Lovitt and N. G. Haring (Eds.), Precision teaching at the Experimental Education Unit, in press.

The purpose of this study was to assess the effects of whole word drill on reading performance in both whole word and phonics-based readers. In a pre-

vious study, it was reported that systematic phonics drill resulted in more improvement in a phonics based reader than in a whole word reader. Performance on related phonics tasks also improved. The present study attempted to determine whether transfer of learning would extend from systematic whole word training to other whole word tasks and to performance in a whole word based reader. Such transfer was not found. Slight transfer, however, from whole word training to part word performance was noted. Later in the study when phonics instruction and feedback on oral reading were scheduled, oral reading was positively influenced.

24. Gardstrom, M. & Lovitt, T. C. Creative writing rates of second graders: Effects on reading their stories and seeing their performance graphs. In T. C. Lovitt and N. G. Haring (Eds.), Precision teaching at the Experimental Education Unit, in press.

The pupils in this study were 17 second grade children. During the first phase the children wrote stories; following the writing period, each pupil read his story to the rest of the class. During the second phase the children still read their stories to the class and, in addition, graphs of their performances were posted. In the third phase the reading privilege was discontinued; the charts, however, continued to be posted. In the final phase the children once again read their stories, but the charts were no longer posted. The measures throughout the study were number of words and sentences written. The highest medians for words and sentences written occurred in the third phase when the charts were posted but the reading privilege was not in effect.

25. Lovitt, T. C. & Eaton, M. Oh! that this too too solid flesh would melt: Direct and daily measurement hath cometh (The erosion of achievement tests). In N. Bartel and S. Axelrod (Eds.), The Handbook for special education research. CEC Publication, in press.

In this article the use of achievement tests to measure academic development, particularly in regard to reading, is examined. Direct and Daily measurement is recommended as a replacement for the achievement test approach. The two systems are compared in regard to three uses of measurement: for placement, evaluation and communication. In order to make these comparisons, achievement test scores and Direct and Daily measurement were obtained from 13 children over a two-year period. In this report both sets of data--achievement test scores and Direct and Daily measurement--from three pupils are described in order to compare the two systems.

26. Lovitt, T. C. Applied behavior analysis techniques and curriculum research. In N. G. Haring and R. L. Schiefelbusch (Eds.), Teaching special children. New York: McGraw-Hill, Inc., in press.

This monograph illustrates how Applied Behavior Analysis techniques can be used to carry out curriculum research. The first section explains the Applied Behavior Analysis methodology, presenting a brief outline of the development of this method, followed by a description of the basic components of the method. The second part of the monograph describes the setting and students used for the curriculum research. The third section briefly describes

several research studies presented by subject matter area: reading, arithmetic, spelling, communication, and pupil management. The final section offers some suggestions for future curriculum research. The author proposes some methodological and procedural generalizations from the research to teachers.

27. Hansen, C. L. & Lovitt, T. C. The relationship between question type and mode of reading on the ability to comprehend. Journal of Special Education, in press.

A year long study of oral reading and comprehension was conducted with a class of seven boys aged 9 - 12 who had been labeled learning disabled. This report deals with two aspects of that study: a) the relative performance of the pupils on three types of comprehension questions (recall, sequence, and interpretation), and b) the relationship between mode of reading (oral or silent) and ability to comprehend.

Three findings relevant to types of comprehension questions are reported: a) comprehension ability was highest on recall questions and lowest on interpretation questions; b) the ability to comprehend all types of questions improved during the year, this improvement varied by type of question; and c) one instructional technique (correction of comprehension errors) resulted in improved performance on all types of comprehension questions.

Two findings relevant to the relationship of mode of reading and ability to comprehend are reported: a) pupils' abilities to comprehend were influenced by mode of reading: comprehension performance was always higher when material was read orally, and b) the ability to comprehend material read both orally and silently improved during the year. The disparity between comprehension performance from one mode to the other remained unchanged from beginning to end of the year.

28. Hansen, C. L. & Lovitt, T. C. Reading: Round one--Matching the child to the book. In Proceedings of Fifth Annual Conference on Behavior Analysis in Education, University of Kansas, in press.

29. Lovitt, T. C. & Hansen, C. L. Round one--Placing the child in the right reader. Journal of Learning Disabilities, in press.

A method for placing children in readers was devised and implemented which combined aspects of the Informal Reading Inventory with techniques developed by applied behavior analysts. Using this method three reading behaviors of pupils were measured directly and frequently: correct oral reading rate, incorrect oral reading rate, and correct comprehension percentage. Seven intermediate age boys with reading problems read and answered questions from books D through K of the Lippincott series. They read five 100-word segments from each reader and answered six comprehension questions from each segment.

Each student was placed in a reader based on his three performance scores during this period. The effectiveness of the placement method was judged in terms of how well it predicted subsequent reading performance in the students' instructional readers.

Two major findings resulted from this study. First, although oral reading rates and comprehension scores generally worsened as the grade level of the material increased, the performance differences between adjacent books were minimal. Correct rate was more sensitive than either incorrect rate or comprehension percentage to changes in grade level. Second, after placement in the readers, all the students progressed satisfactorily throughout the remainder of the year.

30. Lovitt, T. C. Applied behavior analysis and learning disabilities: Curriculum research recommendations. Journal of Learning Disabilities, in press.

This report suggests general and specific research topics that concern learning disabled youngsters. More specifically, the research topics focus on curricular matters: reading, arithmetic, writing, and spelling. An explanation of the research variables included in this report follows a description of the author's conception of learning disabilities. The report briefly describes the Applied Behavior Analysis research methodology and justifies the recommendation for this particular investigative approach.

TEAM I:

PRESENTATIONS AT PROFESSIONAL CONVENTIONS

Curriculum research: A direct and continuous approach.

Paper presented at Symposium on Behavior Analysis in Education, Lawrence, Kansas, April 1970 (Thomas C. Lovitt).

Precision teaching: A system for classroom evaluation.

Paper presented at National Conference for Special Education Administrators, Eugene, Oregon, May 1970 (Thomas C. Lovitt).

Teaching strategies with retarded children.

Paper presented at American Association on Mental Deficiency, Washington, D.C., May 1970 (Thomas C. Lovitt).

The palatability of behavior modification.

Invited address, Distinguished Lecture Series, University of Kentucky, Lexington, Kentucky, October 1970 (Thomas C. Lovitt).

Behavior modification and the current scene.

Conference sponsored by Pennsylvania Department of Welfare, Harrisburg, Pennsylvania, March 1971 (Thomas C. Lovitt).

Precision teaching in special education.

Paper presented at Special Education Colloquium, University of Delaware, Newark, Delaware, March 1971 (Thomas C. Lovitt).

Measuring reading, writing and arithmetic.

Address delivered at Regional Institute for Children with Learning and Behavioral Disabilities, Wisconsin State University, La Crosse, Wisconsin, March 1971 (Thomas C. Lovitt).

An analysis of the effects of variations of instruction on an individual's verbal behavior.

Paper presented at Council for Exceptional Children Convention, Miami, Florida, April 1971 (Thomas C. Lovitt and James O. Smith).

The observation and control of verbal interaction.

Conference on Behavior Analysis in Education, University of Kansas, Lawrence, Kansas, May 1971 (Thomas C. Lovitt, Michael Meighan, and Robert Burgess).

Effects of various reinforcement contingencies on oral reading rate.

Conference on Behavior Analysis in Education, University of Kansas, Lawrence, Kansas, May 1971 (Thomas C. Lovitt, Marie Eaton, Mary Kirkwood, and Judy Pelander).

Scheduling and instructing self-management behavior to elementary age children. National Easter Seal Convention, Portland, Oregon, November 1971 (Thomas C. Lovitt).

Investigación curricular con jóvenes impedidos educacion almente, utilizando tecnicas de análisis conductual aplicado.

Paper presented at Second Symposium on Behavior Modification, University of Mexico, Mexico City, D.F., January 1972 (Thomas C. Lovitt).

Measurement in the classroom.

Chairman, Washington State Council for Exceptional Children Convention, Seattle, Washington, March 1972 (Thomas C. Lovitt).

Achievement tests vs. direct and daily measurement.

Paper presented at Third Conference on Behavior Analysis in Education, University of Kansas, Lawrence, Kansas, May 1972 (Thomas C. Lovitt and Marie Eaton).

Using reinforcement contingencies and teaching aids to alter subtraction performance of children with learning disabilities.

Paper presented at Third Conference on Behavior Analysis in Education, University of Kansas, Lawrence, Kansas, May 1972 (Thomas C. Lovitt and Deborah D. Smith).

Measurement and change in basic academic skills.

Paper presented at Adelphi University, Garden City, Long Island, July 1972 (Thomas C. Lovitt).

Kids have taught me a few things.

Paper presented at State CEC Conference, Boise, Idaho, October 1972 (Thomas C. Lovitt).

Curriculum research.

Paper presented at Regional CEC Conference, Spokane, Washington, October 1972 (Thomas C. Lovitt).

Applying experimental analysis of behavior to investigating curriculum and making instructional decisions.

Paper presented at the Southern California Fourth Annual Conference on Behavior Modification, Los Angeles, California, October 1972 (Thomas C. Lovitt, Marie Eaton, N. Dale Gentry, and Norris G. Haring).

Assessment for learning disabled children.

Paper presented at Learning Disabilities Conference, Moscow, Idaho, January 1973 (Thomas C. Lovitt).

The use of modeling techniques to influence the acquisition of computational arithmetic skills in learning disabled children.

Paper presented at Fourth Annual Conference on Behavior Analysis in Education, University of Kansas, April 1973 (Thomas C. Lovitt and Deborah D. Smith).

The relationship between oral reading and comprehension.

Paper read at National Institute of Education Symposium, Seattle, Washington, July 1973 (Cheryl L. Hansen).

Effects of feedback on content and mechanics of writing.

Paper read at National Institute of Education Symposium, Seattle, Washington, July 1973 (Cheryl L. Hansen).

A study to determine the difficult elements encountered in story problems.

Paper read at National Institute of Education Symposium, Seattle, Washington, July 1973 (Colleen Blankenship).

Alternate approaches to the classification of learning disabled children.

Paper presented at ACLD International Conference, Houston, Texas, March 1974 (Thomas C. Lovitt).

Variables affecting reading rate and comprehension.

Paper read at Regional Reading Research Seminar, Seattle, Washington, April 1974 (Cheryl L. Hansen).

Applied behavior analysis research.

Workshop presented at CEC Convention, New York, April 1974 (Thomas C. Lovitt).

Applied behavior analysis and learning disabilities: Curriculum research recommendations.

Seminar presented at National Institute of Education Symposium, Washington, D.C., June 1974 (Thomas C. Lovitt).

Reading: Round one--matching the child to the book.

Paper presented at Fifth Annual Conference on Behavior Analysis in Education, Kansas City, Kansas, October 1974 (Thomas C. Lovitt and Cheryl L. Hansen).

Behavior modification.

Paper presented at Getting It Together: Inservice Day for Educators, Seattle, Washington, October 1974 (Cheryl L. Hansen).

The influence of instructions and reinforcement contingencies on children's abilities to compute arithmetic problems.

Paper presented at Fifth Annual Conference on Behavior Analysis in Education, Kansas City, Kansas, October 1974 (Thomas C. Lovitt and Deborah D. Smith).

Not all stories are equal (But some are less equal than others).

Paper presented at Regional Reading Research Seminar, Seattle, Washington, March 1975 (Cheryl L. Hansen).

An applied behaviorist views reading comprehension.

Seminar in the Development of Reading Comprehension, Newark, Delaware, July 1975 (Cheryl L. Hansen).

TEAM I:

WORKSHOPS AND MISCELLANEOUS ACTIVITIES

- December 7-11, 1971 Workshop: New Haven, Connecticut (Thomas C. Lovitt).
- July 18, 1972 Workshop: "Measurement and change in basic academic skills," South Central School District, Seattle, Washington (Thomas C. Lovitt).
- July 24-26, 1972 Workshop: "Measurement and change in basic academic skills," Adelphi University, Garden City, Long Island, New York (Thomas C. Lovitt).
- January 31, 1973 Workshop: "Assessment for learning disabled children," University of Idaho Learning Disabilities Workshop, Moscow, Idaho (Thomas C. Lovitt).
- July 11-12, 1973 Workshop: South Central School District Workshop for Teachers, Seattle, Washington (Thomas C. Lovitt).
- August 1, 1973 Workshop: "Precision teaching potpourri: Comments on data decisions, data forms, research steps," Clover Park, Fort Steilacoom, Washington (Thomas C. Lovitt, Cheryl L. Hansen, and Colleen Blankenship).
- April 15, 1974 Workshop: "Applied behavior analysis research," The Council for Exceptional Children Workshop, New York (Thomas C. Lovitt).
- March 27-29, 1974 Presentations and visits to schools: Pocatello, Idaho School District #25, Pocatello, Idaho (Thomas C. Lovitt).
- June 13-14, 1974 Consulting: Child Development Center, Lewiston, Idaho (Thomas C. Lovitt).
- August 19-21, 1974 Workshop: Three-day Workshop for Special Education Teachers, Special Education Center, Great Falls, Montana (Thomas C. Lovitt and Cheryl L. Hansen).

TEAM I

MAJOR CONCLUSIONS: FINDINGS

The goal of the Curriculum Research Classroom over the past five years has been to examine the effects of common teacher practices on pupil performance and to develop effective methods of diagnosing and teaching basic academic skills to intermediate aged learning disabled children. Our population has consisted of seven learning disabled boys from an upper-middle class suburban school district. These students attend our classroom for one year and serve as our research subjects. Each year research "themes" are developed in four areas: reading, spelling, writing, and arithmetic. These themes are sequential in that they have generally followed a logical progression from year to year. For example, the results from last year's arithmetic research served as a basis for planning this year's studies. A description of all the major conclusions or findings which have emerged from the Curriculum Research Classroom is not possible in a few brief sentences; however, some general comments may be made regarding four major "threads" found throughout our research.

First, the matter of precise diagnosis of a student's skill levels has been a subject of concern. Knowledge of each student's current performance level in each academic area is crucial for designing remediation programs. Published diagnostic instruments are generally inappropriate or unavailable. Thus, we have developed diagnostic instruments in each academic area. These diagnostic instruments are later used to evaluate growth in each area.

Second, we have found it useful to distinguish between two levels of pupil performance: acquisition and proficiency. We have found that a student benefits from different instructional procedures depending upon the level of performance he exhibits. For example, if a child is at the acquisition stage,

i.e., just learning how to multiply, he will benefit from direct instruction; whereas if he is proficient, i.e., knows his multiplication facts but too slow or erratic in his performance, instruction is of little use. In our research we have concentrated on analyzing the effects of various teaching strategies when a student is performing at different levels.

Third, we have isolated many variables which appear to influence behavior across various academic subjects. As stated previously, certain kinds of teacher instruction are effective in teaching new skills. These include direct instructions (e.g., "This is how you solve this kind of story problem"), modeling a task for the child, providing teaching aids such as number lines and counters, and drill and practice exercises. Other tactics influence performance when skills are known but not used proficiently. These tactics include reinforcement, error consequences, pupil self-selection of tasks, reinforcers, and self-correction.

Fourth, we have devised methods of determining desired rates for performance and change criteria. Desired rates refer to behavioral statements of the level of performance necessary to demonstrate proficiency in a skill. For example, proficiency on a list of ten spelling words is defined as 100% correct spelling of words for two out of three trials. Change criteria are statements which indicate when a different teaching technique is scheduled if a student fails to increase his performance by at least 30% in each three-day period.

In summary, our research has resulted in an abundance of specific findings related to effective teaching techniques and methods. These findings have important implications for overall classroom organization and daily management plans. The four threads outlined above: precise diagnosis, acquisition versus proficiency, successful interventions, and desired rates and change criteria

can be found throughout these studies. An abstracted bibliography is included which includes the major findings of the published research of the Curriculum Research Classroom.

TEAM I

IMPACT OF NIE-SPONSORED WORK

A. In August 1973, members of Team I, Tom Lovitt, Cherie Hansen, and Colleen Blankenship, held a workshop on "Precision teaching potpourri: Comments on data decisions, data forms, and research steps" at Clover Park, Washington. This workshop was attended by forty special education teachers and administrators. During the course of the workshop we discussed a few studies we were currently engaged in, including a reading program called "Reading Skip." "Reading Skip" is a method we devised to enable students to cover large amounts of readers in a short period of time depending upon their performance.

Using this program we were able to accelerate the progress of our students and enable them to cover up to three years of progress in six months' time. The teachers in the Clover Park District were very interested in our program and its results. We were subsequently invited to return to Clover Park to discuss the "Skip" program in detail. This fall, a group of Clover Park teachers visited the Experimental Education Unit and reported they had successfully employed the "Skip" program in their classrooms and had shared the concept with other teachers. The "Skip" program has been adopted by many teachers in the Seattle area. We have disseminated this program to such places as Montana, Idaho, New Mexico, and Tennessee, to name a few. This is but one example of the impact of our research upon teachers and administrators in many sections of the country.

B. Another example of the impact of our NIE-sponsored work is in the area of the dissemination of research related materials. In order to conduct studies on the effect of question type and mode of reading on comprehension,

we wrote comprehension questions for the Lippincott Basic Readers (1970 edition), Levels D through I. Requests for these questions from teachers and school districts indicated a pressing need for this type of material. Last August we mimeographed a limited number of copies of these questions (100 copies) for dissemination. Thus far, we have sent out over forty sets of questions without advertising on our part. These comprehension questions are in use in the Seattle area, Montana, Idaho, Oregon, and British Columbia. Reports from users of these materials have been favorable.

4. Practitioner Products: To determine if this section is appropriate for your project, consult the definitions on pp. 1-2 of the Guidelines for NIE Product Catalog Entries. Products included would be: curriculum materials, administrator/teacher training materials, replicable models, test and measurement instruments, catalogs, guidelines, etc. If the project has multiple products please supply the information, on separate sheets, for each product. Also, if the status of product components differs, complete a separate set of pages for each component as well as each product.

A. Product Name: LIPPINCOTT'S COMPREHENSION QUESTIONS

Component name (if status of product components differs):

B. Type of Product (Check all that apply)

- ☒ Curriculum materials for students
☐ Administrator/teacher training or development materials
☐ Tests or measurement instruments
☐ Replicable models
☐ Other, please specify (catalogs, guidelines, handbooks, resource guides, etc.)

C. Product's Developmental Status (Check all that will apply by November 30, 1975)

- ☒ Early development complete (design, prototypes or first drafts, pilot tests)
☐ Field (operationally ready) forms of the product complete (original or revised product forms that are sufficiently complete to allow them to be used in a field setting where the developer's presence is not continually required to make them work)
☐ Revised forms are complete, making the product suitable for release through a publisher or on any basis
☐ Necessary implementation aids completed (teacher guides, step-by-step implementation suggestions, trouble shooting suggestions, orientation materials, etc.)
☐ Postpublication revisions completed (errors have been corrected or product has been updated or improved after initial publication)
☐ User adaptations have been documented (special user groups have transformed the product to meet their unique needs or constraints)
☐ Other, please specify

D. Developmental Costs of the Product to Date

Please give approximate estimates of costs ($\pm 15\%$ range acceptable), including such activities as planning, evaluation, dissemination to trial sites, overhead costs, etc.

	<u>Research and Development Costs</u>	<u>Dissemination and Utilization Costs</u>
OE Funds	\$ <u>4,634.00</u>	<u> </u>
NIE Funds	\$ <u>20,934.00</u>	<u>\$575.00 (100 copies)</u>
*Other ^{1/} Funds	\$ <u>3,000.00</u>	<u> </u>
TOTAL	\$ <u>28,568.00</u>	<u>\$575.00</u>

E. Product's Evaluation Status (Check all that will apply by November 30, 1975)

- ☐ Marketing or feasibility studies completed
- ☐ Small-scale field tests of practicability, transportability, or replicability completed (e.g., studies that might answer the question: Can a teacher use this product without major intervention by the developer?)
- ☐ Small-scale, controlled tests of effectiveness (e.g., tests that would answer questions related to product effects by controlling for the effects of other variables or circumstances that might have produced the same result or by performing followup studies of these pilot or field test product users)
- ☐ Large-scale replications in a number of sites to confirm the practicability, transportability, and replicability of the product, as well as to generally confirm the findings for a range of target users and verify previous findings
- ☐ Followup studies of the impact of the product's implementation or of product improvement several months or years after the product had been released and was no longer under the developer's control
- ☒ Other, please specify
Product developed for research purposes. Distribution on small scale.

^{1/}If you have any way of estimating it, please indicate the "leverage" effect your project has had in generating other funds, for example, expenditures for schools to buy or install the product, contributions by foundations to development or dissemination. If the situation is complex, a summary breakdown would be helpful.

F. Distribution Status (Check all that will apply by November 30, 1975)

- ☒ Interim version released and is available either on an inhouse basis (e.g., with a revolving fund) or through a temporary printing arrangement
- ☐ A search is underway for an external publisher
- ☐ A final version is available on an inhouse basis
- ☐ A search for an external publisher has been concluded; a publisher has been identified but a contract has not been signed
- ☐ A search for an external publisher has been concluded and satisfactory publishing arrangements have been made
- ☐ A search for an external publisher has been concluded, but a publisher was not secured and it seems unlikely that satisfactory external arrangements will be made
- ☐ The product is on the market and available for sale
- ☐ The product is available on a loan or rental basis (from publisher, National Audio Visual Center, etc.)
- ☐ The product is available from ERIC (microfiche or hard copy)
- ☐ Other, please specify

G. Dissemination Status (Check all that will apply by November 30, 1975)

- ☐ Informational and/or promotional materials available (brochures, catalogs, sample materials, etc.)
- ☐ Informational and/or promotional materials have been distributed on a national basis--reaching at least 25 percent of the potential market
- ☐ Informational or promotional briefings have been held across the country (for example, 10 or more briefings to potential audiences: at conventions, specially arranged introductions, or to personnel in State education agencies)
- ☐ Several major field demonstrations have been held (for example, the product has been installed in several schools around the country and arrangements have been made in the area of the demonstration for visitors to be brought to the site, shown the product in use, and talk with users)

_____ Large-scale field testing has occurred that served as an initial marketing device for the product among early adopters

X Product available on trial basis at no or minimum cost to user

_____ Other, please specify

II. Implementation Assistance Status (Check all that will apply by November 30, 1975)

_____ A cadre of trained consultants, trainers, or other appropriate personnel is available to assist people in the use of the product

_____ Training or other technical assistance mechanisms available have been used by over 10 percent of the current users of the product

X If you believe that training or technical assistance is unnecessary for the use of the product, please check this line

_____ Other, please specify

I. Product Sales

✓ Total dollar sales to March 1975 (estimate) \$ 400.00 No. of years (1)
reversed to offset cost

• Estimated total number of product units sold to March 1975. Define a unit as the largest selling product item, i.e., student materials rather than teacher's manual. 40 No. of years (1)

• Estimated total individual users from target population (teachers if teacher training product; students if product is primarily designed for student use, etc.) to March 1975. Specify target population reference group. _____ No. of years ()

• Estimated universe of possible individual target population users in the United States for 1976 _____ No. of years ()

• At a later time would it be possible to break these figures down into annual sales and users? _____ Yes _____ No

J. User Sites

On the attached page, please check the States where the product has been used in more than one local-district. If you have an existing directory of purchasers or users, computer lists, lists of product use by Congressional district, or other formal devices for tracking users, we would like to know of them and receive a copy of the directory or sample pages from the computer list. We don't require complete lists but rather a sense of the extent of the information.

(Please check one)

- ☐ Published user list available
- ☒ Unpublished, inhouse user list available
- ☐ No user list available, but could be developed
- ☐ User list would be impossible to develop

K. Product Impact

On a separate page, please give unique anecdotal evidence of the product's impact. (Keep it short, but this is particularly important information which we need for Congressional testimony.) Also identify the location of incident and the Congressional district in which it occurred.

PRODUCT IMPACT

The Lippincott's Comprehension Questions were developed as a tool for research on the ability of learning disabled students to comprehend written material. Subsequent dissemination of the research findings prompted teachers and administrators to request copies of these comprehension questions. Therefore, a limited printing of 100 copies of the questions was made. Distribution and requests have been accomplished without any promotional advertisement indicating a need on the part of classroom teachers for structured pre-written comprehension questions. Thus far, 40 sets of questions have been sold.

PRODUCT USER SITES

Please check the States (or the District of Columbia, Puerto Rico, and Virgin Islands) where the product has been used in more than one local district. Also, if possible note the fact that product was used in a large urban district (New York City, Chicago, Los Angeles, etc.) within that State.

☐ ALABAMA
☐ ALASKA
☐ ARIZONA
☐ ARKANSAS
☐ CALIFORNIA
☐ COLORADO
☐ CONNECTICUT
☐ DELAWARE
☐ FLORIDA
☐ GEORGIA
☐ HAWAII
☒ IDAHO
☐ ILLINOIS
☐ INDIANA
☐ IOWA
☐ KANSAS
☐ KENTUCKY
☐ LOUISIANA
☐ MAINE
☐ MARYLAND
☐ MASSACHUSETTS
☐ MICHIGAN
☐ MINNESOTA
☐ MISSISSIPPI
☐ MISSOURI
☒ MONTANA
☐ NEBRASKA

☐ NEVADA
☐ NEW HAMPSHIRE
☐ NEW JERSEY
☐ NEW MEXICO
☐ NEW YORK
☐ NORTH CAROLINA
☐ NORTH DAKOTA
☐ OHIO
☐ OKLAHOMA
☒ OREGON
☐ PENNSYLVANIA
☐ RHODE ISLAND
☐ SOUTH CAROLINA
☐ SOUTH DAKOTA
☐ TENNESSEE
☐ TEXAS
☐ UTAH
☐ VERMONT
☐ VIRGINIA
☒ WASHINGTON
☐ WEST VIRGINIA
☐ WISCONSIN
☐ WYOMING
☐ PUERTO RICO
☐ DISTRICT OF COLUMBIA
☐ VIRGIN ISLANDS
☐ OTHER, PLEASE SPECIFY

NIE PRODUCT: LIPPINCOTT'S COMPREHENSION QUESTIONS (SIX BOOKS, D THROUGH I)

DEVELOPER/AUTHOR: Curriculum Research Classroom
Experimental Education Unit, WJ-10
Child Development and Mental Retardation Center
University of Washington
Seattle, Washington 98195

Cheryl L. Hansen, Head Teacher
Thomas C. Lovitt, Coordinator
Norris G. Baring, Project Director

NARRATIVE DESCRIPTION

The Lippincott's Comprehension Questions provide for the daily assessment of students' literal and inferential comprehension in the Lippincott Basic Reading Series, 1970 edition, Books D through I (grades 1² through 4). Three types of comprehension questions were written for each fifty running words of text: recall, sequence, and interpretation. These questions require short written or oral responses. Recall questions deal with facts explicitly stated in the story; for example, "Who lived under the bridge?" Sequence questions concern the action of the story; for example, "After the goat got over the bridge, what did he do?" Interpretation questions require many different skills, including translation, inference, and synthesis; for example, "Why did the troll keep letting himself get tricked?" Book I includes a measure of vocabulary presented in multiple choice format.

The suggested assignment per day is 500 words of oral or silent reading and one page of 30 comprehension questions. The time required to complete this assignment is approximately 30 minutes. Suggestions for modification of the program to meet student needs are provided.

SUBJECT AREAS

The Lippincott's Comprehension Questions are made up of six books, each covering one grade level. Within each book, the questions are arranged sequentially on the page so that the first question of each type deals with information from the beginning of the reading assignment, while the last questions of each type pertain to material from the last 50 words of the reading selection.

INTENDED USERS AND BENEFICIARIES

The Lippincott's Comprehension Questions are designed to be used by students of all abilities in grades 1 through 4. This product was developed for intermediate-aged learning disabled students, but has been used successfully with emotionally disturbed, educable mentally retarded, and regular students.

GOALS OR PURPOSES

The purpose of these comprehension questions is to provide students with daily opportunities to respond to different types of comprehension questions.

PATTERNS OF USE

The comprehension exercises for each story may be used in any order. These questions are designed to be used in conjunction with the Lippincott Basic Reading Series. The product is not designed to be instructional in itself. The teacher is encouraged to modify the program in accordance with student needs and to add instructional or reinforcement components where feasible.

ASSESSMENT PROVISIONS

Students are placed in the Lippincott Reading Series by means of a modified informal reading inventory developed by and available from the Curriculum Research Classroom. The inventory consists of three 100-word samples of reading from each Lippincott reader and corresponding comprehension questions. Each student is placed in the highest reader in which he attains an average 45-60 correct words per minute, 4-8 error words per minute, and 50-75% comprehension. There is no formal testing during instruction. Presumably, student evaluation is an ongoing part of the teacher's activities. It is suggested that a student progress to the next higher reading level based upon improved performance or some criteria such as 90% comprehension over a one-week period.

TIME REQUIREMENTS

The product is intended for use approximately one half hour daily.

IMPLEMENTATION PROCEDURES

No special training or organizational requirements are necessary for use except the availability of the Lippincott Basic Reading Series.

MATERIALS, EQUIPMENT AND PERSONNEL REQUIREMENTS

Required items	Quantity needed	Cost per item	Replacement rate
Individual set (Includes 8 books of com- prehension questions)	1 set per student	\$10	Consumable each time unit is used

Summary Cost Information

The comprehension questions are only available in sets of 8 books each, covering grades 1 through 4. The materials should be used as a supplement to the Lippincott Basic Reading Series, 1970 edition.

Personnel Required for Product Adoption and Implementation

A classroom teacher without special training may use this material.

ASSURANCES AND CLAIMS

The Lippincott's Comprehension Questions have been used successfully for three years at the Experimental Education Unit by the developer and other teachers. The comprehension questions have been disseminated in many areas throughout the Northwest. The developer has not received any reports of harm associated with the use of this product. The materials have been used with learning disabled, emotionally disturbed, mentally retarded, and regular students.

AVAILABILITY

Lippincott's Comprehension Questions were developed, and are distributed on a limited basis, for research purposes.

Distributor

Sets of the comprehension questions are currently available from the developer upon request to:

Purchasing Agent
Experimental Education Unit, WJ-10
Child Development and Mental Retardation Center
University of Washington
Seattle, Washington 98195

INFORMATION CURRENT AS OF APRIL 1975.

4. Practitioner Products: To determine if this section is appropriate for your project, consult the definitions on pp. 1-2 of the Guidelines for NIE Product Catalog Entries. Products included would be: curriculum materials, administrator/teacher training materials, replicable models, test and measurement instruments, catalogs, guidelines, etc. If the project has multiple products please supply the information, on separate sheets, for each product. Also, if the status of product components differs, complete a separate set of pages for each component as well as each product.

A. Product Name: STORY PROBLEMS (An Experimental Packet Designed for the Collection of Story Problem Data)

Component name (if status of product components differs):

B. Type of Product (Check all that apply)

- ☒ Curriculum materials for students
☐ Administrator/teacher training or development materials
☐ Tests or measurement instruments
☐ Replicable models
☐ Other, please specify (catalogs, guidelines, handbooks, resource guides, etc.)

C. Product's Developmental Status (Check all that will apply by November 30, 1975)

- ☒ Early development complete (design, prototypes or first drafts, pilot tests)
☐ Field (operationally ready) forms of the product complete (original or revised product forms that are sufficiently complete to allow them to be used in a field setting where the developer's presence is not continually required to make them work)
☐ Revised forms are complete, making the product suitable for release through a publisher or on any basis
☐ Necessary implementation aids completed (teacher guides, step-by-step implementation suggestions, trouble shooting suggestions, orientation materials, etc.)
☐ Postpublication revisions completed (errors have been corrected or product has been updated or improved after initial publication)
☐ User adaptations have been documented (special user groups have transformed the product to meet their unique needs or constraints)
☐ Other, please specify

D. Developmental Costs of the Product to Date

Please give approximate estimates of costs ($\pm 15\%$ range acceptable), including such activities as planning, evaluation, dissemination to trial sites, overhead costs, etc.

	<u>Research and Development Costs</u>	<u>Dissemination and Utilization Costs</u>
OE Funds	\$ _____	_____
NIE Funds	\$ <u>4,325.00</u>	<u>\$750.00 (100 copies)</u>
Other ^{1/} Funds	\$ <u>1,000.00</u>	_____
TOTAL	\$ <u>5,325.00</u>	<u>\$750.00</u>

E. Product's Evaluation Status (Check all that will apply by November 30, 1975)

- ☐ Marketing or feasibility studies completed
- ☐ Small-scale field tests of practicability, transportability, or replicability completed (e.g., studies that might answer the question: Can a teacher use this product without major intervention by the developer?)
- ☐ Small-scale, controlled tests of effectiveness (e.g., tests that would answer questions related to product effects by controlling for the effects of other variables or circumstances that might have produced the same results or by performing followup studies of these pilot or field test product users)
- ☐ Large-scale replications in a number of sites to confirm the practicability, transportability, and replicability of the product, as well as to generally confirm the findings for a range of target users and verify previous findings
- ☐ Followup studies of the impact of the product's implementation or of product improvement several months or years after the product had been released and was no longer under the developer's control
- ☒ Other, please specify
Product developed for research purposes. Distribution on small scale.

^{1/}If you have any way of estimating it, please indicate the "leverage" effect your project has had in generating other funds, for example, expenditures for schools to buy or install the product, contributions by foundations to development or dissemination. If the situation is complex, a summary breakdown would be helpful.

F. Distribution Status (Check all that will apply by November 30, 1975)

- ☒ Interim version released and is available either on an inhouse basis (e.g., with a revolving fund) or through a temporary printing arrangement
- ☐ A search is underway for an external publisher
- ☐ A final version is available on an inhouse basis
- ☐ A search for an external publisher has been concluded; a publisher has been identified but a contract has not been signed
- ☐ A search for an external publisher has been concluded and satisfactory publishing arrangements have been made
- ☐ A search for an external publisher has been concluded, but a publisher was not secured and it seems unlikely that satisfactory external arrangements will be made
- ☐ The product is on the market and available for sale
- ☐ The product is available on a loan or rental basis (from publisher, National Audio Visual Center, etc.)
- ☐ The product is available from ERIC (microfiche or hard copy)
- ☐ Other, please specify

G. Dissemination Status (Check all that will apply by November 30, 1975)

- ☐ Informational and/or promotional materials available (brochures, catalogs, sample materials, etc.)
- ☐ Informational and/or promotional materials have been distributed on a national basis--reaching at least 25 percent of the potential market
- ☐ Informational or promotional briefings have been held across the country (for example, 10 or more briefings to potential audiences: at conventions, specially arranged introductions, or to personnel in State education agencies)
- ☐ Several major field demonstrations have been held (for example, the product has been installed in several schools around the country and arrangements have been made in the area of the demonstration for visitors to be brought to the site, shown the product in use, and talk with users)

_____ Large-scale field testing has occurred that served as an initial marketing device for the product among early adopters

 X Product available on trial basis at no or minimum cost to user

_____ Other, please specify

H. Implementation Assistance Status (Check all that will apply by November 30, 1975)

_____ A cadre of trained consultants, trainers, or other appropriate personnel is available to assist people in the use of the product

_____ Training or other technical assistance mechanisms available have been used by over 10 percent of the current users of the product

 X If you believe that training or technical assistance is unnecessary for the use of the product, please check this line

_____ Other, please specify

I. Product Sales

. Total dollar sales to March 1975 (estimate) \$ 20.00 No. of years ()
reversed to offset cost (2 months)

. Estimated total number of product units sold to March 1975. Define a unit as the largest selling product item, i.e., student materials rather than teacher's manual.

 4 No. of years ()
(2 months)

. Estimated total individual users from target population (teachers if teacher training product; students if product is primarily designed for student use, etc.) to March 1975. Specify target population reference group.

(10 additional copies distributed at no charge)

 No. of years ()

. Estimated universe of possible individual target population users in the United States for 1976

 No. of years ()

. At a later time would it be possible to break these figures down into annual sales and users?

 Yes No

J. User Sites

On the attached page, please check the States where the product has been used in more than one local district. If you have an existing directory of purchasers or users, computer lists, lists of product use by Congressional district, or other formal devices for tracking users, we would like to know of them and receive a copy of the directory or sample pages from the computer list. We don't require complete lists but rather a sense of the extent of the information.

(Please check one)

- ☐ Published user list available
- ☒ Unpublished, inhouse user list available
- ☐ No user list available, but could be developed
- ☐ User list would be impossible to develop

K. Product Impact

On a separate page, please give unique anecdotal evidence of the product's impact. (Keep it short, but this is particularly important information which we need for Congressional testimony.) Also identify the location of incident and the Congressional district in which it occurred.

PRODUCT IMPACT

The Story Problems Packet was developed as a tool for research for the collection of story problem data. The packet is designed to be used by teachers for instruction of four classes of story problems. Subsequent dissemination of the research findings prompted teachers and administrators to request copies of the Story Problems Packet. Therefore, a limited printing of 100 copies of the packet was made. Preliminary distribution has begun and a small number of copies have thus far been requested.

PRODUCT USER SITES

Please check the States (or the District of Columbia, Puerto Rico, and Virgin Islands) where the product has been used in more than one local district. Also, if possible note the fact that product was used in a large urban district (New York City, Chicago, Los Angeles, etc.) within that State.

☐ ALABAMA
☐ ALASKA
☐ ARIZONA
☐ ARKANSAS
☐ CALIFORNIA
☐ COLORADO
☐ CONNECTICUT
☐ DELAWARE
☐ FLORIDA
☐ GEORGIA
☐ HAWAII
☐ IDAHO
☐ ILLINOIS
☐ INDIANA
☐ IOWA
☐ KANSAS
☐ KENTUCKY
☐ LOUISIANA
☐ MAINE
☐ MARYLAND
☐ MASSACHUSETTS
☐ MICHIGAN
☐ MINNESOTA
☐ MISSISSIPPI
☐ MISSOURI
☐ MONTANA
☐ NEBRASKA

☐ NEVADA
☐ NEW HAMPSHIRE
☐ NEW JERSEY
☐ NEW MEXICO
☐ NEW YORK
☐ NORTH CAROLINA
☐ NORTH DAKOTA
☐ OHIO
☐ OKLAHOMA
☐ OREGON
☐ PENNSYLVANIA
☐ RHODE ISLAND
☐ SOUTH CAROLINA
☐ SOUTH DAKOTA
☐ TENNESSEE
☐ TEXAS
☐ UTAH
☐ VERMONT
☐ VIRGINIA
☒ WASHINGTON
☐ WEST VIRGINIA
☐ WISCONSIN
☐ WYOMING
☐ PUERTO RICO
☐ DISTRICT OF COLUMBIA
☐ VIRGIN ISLANDS
☐ OTHER, PLEASE SPECIFY

NIE PRODUCT: STORY PROBLEMS
(An Experimental Packet Designed for the Collection of
Story Problem Data)

DEVELOPER/AUTHOR: Curriculum Research Classroom
Experimental Education Unit, WJ-10
Child Development and Mental Retardation Center
University of Washington
Seattle, Washington 98195

Colleen Blenkinship, Teacher
Thomas C. Lovitt, Coordinator
Norris G. Haring, Project Director

NARRATIVE DESCRIPTION

The Story Problem Packet contains the materials and describes the procedures used by the Curriculum Research Classroom to teach students how to compute story problems. It is an experimental packet designed for the collection of story problem data. Permission was granted by four publishers to reproduce story problems contained in their arithmetic series. These include: Addison-Wesley; Holt, Rinehart and Winston; Houghton Mifflin; and Scott Foresman and Company.

The packet contains a placement test, criteria for progression through the program, story problems, teacher cue sheets, and data collection forms. It was developed for students who have difficulty solving one step story problems utilizing simple addition and subtraction operations.

The suggested assignment per day is twenty story problems. The time required to complete the assignment generally ranges between 5 to 20 minutes per day.

SUBJECT AREAS

Story problems within the packet have been combined to form classes of problems. Class 1 problems involve additive-addition and subtractive-subtraction processes; Class 2 problems include additive-subtraction and subtractive-subtraction processes; Class 3 problems cover additive-subtraction and subtractive-addition processes; and Class 4 problems involve comparison-addition and comparison-subtraction processes. Each class consists of twenty problems, of which ten suggest additive situations and ten suggest subtractive situations.

INTENDED USERS OR BENEFICIARIES

The Story Problem Packet was developed specifically for intermediate-aged learning disabled students, but may be used with any student meeting the placement criteria.

GOALS OR PURPOSES

The purposes of the packet are 1) to aid in the collection of data on student performance in four classes of story problems; 2) to provide teachers with a set of instructional procedures useful in teaching story problems; and 3) to teach students how to correctly solve four types of story problems.

PATTERNS OF USE

The packet is criterion-referenced. Each student progresses sequentially through each story problem class dependent upon demonstration of mastery of each class of problems. Criteria for mastery and rules for changing teaching techniques based upon student performance are included.

ASSESSMENT PROVISIONS

Three types of placement data are collected. First, the student must demonstrate mastery of the addition and subtraction facts included in the packet. Second, the student is administered a written probe test of all four classes of story problems. Third, the student is administered an equivalent verbal probe test. The data from the two story problem probes are analyzed by class and type of error to determine appropriate placement within the program. The written and verbal probes are also used to assess a student's performance at the conclusion of the program.

TIME REQUIREMENTS

The time required to complete the program will vary according to individual progress rates. Typically, students have completed the entire packet in 25 weeks. Teachers generally devote between 5 to 20 minutes per day to the materials.

IMPLEMENTATION PROCEDURES

The Story Problem Packet does not require a specialist teacher for administration. The materials have been used with students in grades 3 through 5, but may be used with younger or older students depending upon performance on the entry skill measures. It is recommended that the packet be administered individually or in small groups. The packet includes directions for all procedures for the teacher. The materials are all-inclusive and may be used to supplement currently used arithmetic programs.

MATERIALS, EQUIPMENT AND PERSONNEL REQUIREMENTS

Required items	Quantity needed	Cost per item	Replacement rate
Story Problem Packet (includes placement test, student worksheets, data collection sheets, and teacher directions)	1 set per student	\$4.50 (plus tax)	Packet is consumable by each student

Personnel Required for Product Adoption and Implementation

A classroom teacher without special training may use the Story Problem Packet.

ASSURANCES AND CLAIMS

The Story Problem Packet has been used successfully for three years at the Experimental Education Unit by the developer and other teachers. This packet has been disseminated within the Seattle area. The developer has not received any reports of harm associated with the use of the materials. The packet has been used with elementary-aged learning disabled, emotionally disturbed, and mentally retarded students.

AVAILABILITY

The Story Problem Packet was developed, and is distributed on a limited basis, for research purposes.

Distributor

The Story Problem Packet is currently available from the developer upon request to:

Purchasing Agent
Experimental Education Unit, WJ-10
Child Development and Mental Retardation Center
University of Washington
Seattle, Washington 98195

INFORMATION CURRENT AS OF APRIL 1975.

Attachment 1

DISSEMINATION STATUS REQUEST

Data collected through this form will be used as management information by the School Practice and Service staff to highlight and summarize the outcomes of projects supervised or funded by NIE^{*} and to facilitate our FY 76 planning. Projects which contributed to the growth of knowledge should describe the types of knowledge generated, the major findings, and anecdotal examples of impact on educational research, policy, or practice (see Section 3, "Knowledge Outcomes"). If the project produced products, a longer format for reporting data has been provided (see Section 4, "Practitioner Products"). If multiple products were developed by a project, status information should be provided for each product separately.

We need this information on every NIE-sponsored product, regardless of its stage of development, unless the product has been completely dropped and is no longer regarded as viable by the developer.

The following outline contains the items of information needed:

1. Official Project Title: A PROGRAM PROJECT FOR THE INVESTIGATION AND APPLICATION OF PROCEDURES FOR ANALYSIS AND MODIFICATION OF BEHAVIOR OF HANDICAPPED CHILDREN - Team II
2. Contract/Grant No.: OEG-0-70-3916
3. Knowledge Outcomes (theories, research conclusions, etc.; complete only if there were such outcomes)

- A. Give the number of reports, articles, books, speeches, etc. generated by the project (either during the project or subsequently). A bibliography of published articles would be welcomed in addition.

<u>3</u>	Articles in professional journals
<u>-</u>	Articles in popular news media
<u>2</u>	Articles or chapters in books
<u>-</u>	Books
<u>9</u>	Presentations at professional conventions
<u>5</u>	Other (please describe) Slide Tape Presentations
<u>2</u>	Workshops
<u>48</u>	Working Papers

- B. In a few brief sentences describe the major conclusions or findings that have emerged from your work:

(See attached)

- C. Give one or two anecdotal examples of the impact your NIE-sponsored work has had on educational research, policy, or practice, including any indication of use that you or others have made of your findings (additional research, modification of educational practice, etc.). (Please type this material on a separate page and attach.)

(See attached)

*Include OE or OEO projects transferred to NIE.

TEAM II:

PRESENTATIONS AT PROFESSIONAL CONFERENCES

Achievement tests vs. direct and daily measurement.

Paper read at Regional CEC Conference, Seattle, Washington, March 1972 (Thomas C. Lovitt and Marie Eaton).

Achievement tests vs. direct and daily measurement.

Paper presented at Third Conference on Behavior Analysis in Education, University of Kansas, Lawrence, Kansas, May 1972 (Thomas C. Lovitt and Marie Eaton).

Should you use achievement tests?

Paper read at Local CEC Conference, Seattle, Washington, October 1972 (Marie Eaton).

Applying experimental analysis of behavior to investigating curriculum and making instructional decisions.

Paper presented at the Southern California Fourth Annual Conference on Behavior Modification, Los Angeles, California, October 1972 (Thomas C. Lovitt, Marie Eaton, N. Dale Gentry, and Norris G. Haring)..

The comparative effects of new word drill and error word drill on reading performance.

Symposium presented at the Experimental Education Unit, Child Development and Mental Retardation Center, University of Washington, Seattle, Washington, July 1973 (Marie Eaton and Luella Haisch).

An Intrasample analysis of performance in programmed reading texts.

Symposium presented at the Experimental Education Unit, Child Development and Mental Retardation Center, University of Washington, Seattle, Washington, July 1973 (Felix Fillingsley and Carl Swenson).

Procedures for the direct assessment and diagnosis of academic and social behavior deficits and excesses: The academic and social behavior assessment kit.

Symposium presented at the Experimental Education Unit, Child Development and Mental Retardation Center, University of Washington, Seattle, Washington, July 1973 (Mike Clark, N. Dale Gentry and Marie Eaton).

Variables effecting reading rate and comprehension.

Paper read at International Reading Association Reading Research Seminar, Seattle, Washington, April 1974 (Marie Eaton and Cheryl Hansen).

Not all stories are equal (But some are less equal than others).

Paper read at International Reading Association Reading Research Seminar, Seattle, Washington, March 1975 (Cheryl Hansen and Marie Eaton).

TEAM II:

WORKSHOPS AND MISCELLANEOUS ACTIVITIES

- June 25-26, 1974 Workshop: "Applied behavior analysis procedures in the classroom," University of British Columbia, College of Education, Seattle, Washington (Marie Eaton).
- March 17, 19, 24, 26, 31, April 2, 1975 Workshop: "Applied behavior analysis procedures in the classroom and implications for instruction," Macquarie University, Department of Education, New South Wales, Australia (Marie Eaton).

TEAM II:

PUBLICATIONS

- Billingsley, F. F. & Smelser, S. J. A group approach to classroom management: The "behavior game." Teaching Exceptional Children, 1974, 7, 30-33.
- Clennon, S. Using school activities to train special education pupils for employment. Teaching Exceptional Children, 1975, in press.
- Eaton, M. D. & Lovitt, T. C. Achievement tests vs. direct and daily measurement. In G. Semb (Ed.), Behavior analysis and education - 1972. Lawrence, Kansas: University of Kansas Press, 1972, Pp. 78-87.
- Lovitt, T. C. & Eaton, M. Oh! that this too too solid flesh would melt: Direct and daily measurement hath cometh (The erosion of achievement tests). In N. Bartel and S. Axelrod (Eds.), The handbook for special education research. CEC Publication, 1974, in press.
- Lovitt, T. C., Eaton, M., Kirkwood, M. E., & Pelander, J. Effects of various reinforcement contingencies on oral reading rate. In E. A. Ramp and B. L. Hopkins (Eds.), A new direction for education: Behavior analysis. Lawrence, Kansas: Department of Human Development, 1971, Pp. 54-71.
- Lovitt, T. C., Lovitt, A. O., Eaton, M., & Kirkwood, M. The acceleration of inappropriate comments by a natural consequence. Journal of School Psychology, 1973, 11, 149-154.

Working Papers

(In numerical order)

1. Eaton, M. & O'Connell, S. The improvement of performance on daily math assignments through a free choice contingency.
2. Craig, J. The effects on oral reading rate of two reinforcements given at various schedules.
3. Billingsley, F. & Smelser, S. A group contingency system: An analysis of component effects.
4. Hedges, M. J. A project to investigate acquisition and maintenance of spelling words by pupils held to criteria for one, two and three days.
5. Billingsley, F. An examination of the adequacy of non-continuous data.
6. Bramer, K. The effect of reduction of problems per page in accelerating arithmetic performance.

7. Eaton, M. & Swenson, A. An investigation of the difference in maintenance rates of addition probes of pupils held to criteria for one, two or three days.
8. Lynch, V. The effects of varied contract rates on math performance.
9. Gentry, D., Eaton, M., Gardebring, J., & Kohnstamm, L. Three projects: The influence of drill on oral reading.
10. Clennon, S. & Eaton, M. The effect of pre-practice on acquisition of sight vocabulary.
11. Lynch, V. & Eaton, M. Applied behavior analysis of the influence of pre-viewing on oral reading rates.
12. Taga, S. The effects and side effects of pre-reading comprehension questions and controlling the type of accuracy of comprehension and oral reading rate.
13. Eaton, M. & Feldman, A. The influence of self-directed and teacher-directed flashcard drill on performance in basic add facts.
14. Bennett, P. A comparison of programmed and guided-discovery instruction on acquisition rate in mathematics.
15. Bauerle, L. & Murakami, P. An initial program to teach the preparation of simple foods to the mildly retarded.
16. Clennon, S. Using school activities to train special education students for employment.
17. Swenson, C. The reduction of disruptive classroom behavior through the systematic application of rate limit reduction within a group consequence system.
18. Billingsley, F. A comparison of pupil performance under constant and variable interval conditions.
19. Billingsley, F. & Adams, G. An analysis of pupil performance under constant interval and constant assignment conditions.
20. Billingsley, F. & Swenson, C. An intrasample analysis of reading performance in programmed texts.
21. Swenson, C. Precision teaching need not be a data recording nightmare.
22. Eaton, M., Lovitt, T. C., Sayre, E., & Lynch, V. Applied behavior analysis of the influence of previewing on oral reading rates.
23. Eaton, M. & Haisch, L. A comparison of the effects of new vs. error word drill on reading performance.

24. Craig, J. The use of imitation and questions in training two speech deficient children to use complete sentences.
25. Billingsley, F. & Smelser, S. A group approach to classroom management: The behavior game.
26. Billingsley, F. Eating program for the severely mentally retarded.
- 27.
28. Liberty, K. A. The non-effect of practice on the retention of spelling words learned to criterion.
29. Gentry, D., Adams, G., & Hazel, L. The influence of viewing charts and self-charting on pupil's oral reading performance.
30. Fox, S. A method for collecting data to demonstrate the effects of teacher behaviors on pupil performance: A pilot study.
31. Veilleux, C. An investigation of pupil performance to determine the effectiveness of massed versus distributed drill in the acquisition of beginning math facts.
32. Zander, M. Combined fixed ratio reinforcement schedule with drill to increase academic correct rate.
33. Lynch, V. Effects of stable vs. accelerating contract rates on mathematics performance.
34. Brush, E. & Gray, D. Development of eye contact in interaction with unfamiliar adults in a moderately retarded child.
35. Gargagliano, C. Effects of massed vs. distributed drill practice on acquisition and maintenance of basic sight words.
36. Liberty, K. Adverse effects of self correction on subjects' mathematics rates.
37. McGuigan, C. Four studies investigating the effects of routine and novel drill on acquisition and proficiency rates of learning disabled boys.
38. Snowden, J. Effects of reinforcement on the counting skills of a retarded girl.
39. Hazel, L. Accuracy vs. accuracy plus rate used as criteria in a mathematics program.
40. Suta, C. & Weaver, Z. Review of statistical tests used in selected applied behavior analysis studies.
41. Finholt, B. Applied behavior analysis studies of self-management in the classroom.

42. Liberty, K. Effects of flashcard drill on oral identification of social sight vocabulary.
43. Zander, H. The effects of lesson reduction on academic behavior of a primary pupil.
44. Baird, P. Effects of adult attention contingencies on fighting behaviors of two male siblings.
45. Christensen, S. The effects of self-marking on an inappropriate classroom behavior.
46. Eaton, M. Decision making rules and tools.
47. Fox, S. Methods for establishing aims (desired rate objectives).
48. Eaton, M. Placement in curricular materials.
49. Granger, D. The effects of self-recording upon household behavior.

Slide Tape Presentations

Eaton, M. D. & Haisch, L. New vs. error word drill.

Eaton, M. D. & Lovitt, T. C. Achievement tests vs. direct, daily measurement.

Hansen, C. & Eaton, M. Not all stories are equal (But some are more equal than others).

McGuigan, C. The effects of novel and routine drill on the acquisition and proficiency rates of learning disabled students.

Weaver, Z. Smyth, J., Rinke, C., & Eaton, M. Placement, programming, and pool.

TEAM II:

ANNOTATED BIBLIOGRAPHY

Articles in Professional Journals

Billingsley, F. F. & Smelser, S. A group approach to classroom management: The "behavior game." Teaching Exceptional Children, 1974, 7, 30-33.

Two experiments involving the manipulating of group contingency system components were performed with special class pupils. Experiment I indicated that tallying the occurrence of inappropriate behaviors on a chalk board and verbalizing teacher-desired limits were ineffective in reducing the frequency of inappropriate behaviors. The application of a punishing contingency upon surpassing limits, however, was found to reduce behavior frequency to a level approximating the limits and limit reduction appeared to increase the variability with which behaviors occurred. Experiment II replicated the occurrence of limit approximation and variability increase when limits were further needed. Implications for classroom teachers were discussed.

Clennon, S. Using school activities to train special education pupils for employment. Teaching Exceptional Children, 1975, in press.

The special child as well as the regular student deserves every opportunity to succeed in the working world and to prepare for a productive and self-satisfying adulthood. This paper explains how to develop task analysis and task sequence to train a 15-year-old special education student with academic learning disabilities as a teacher aide.

Swenson, C. R. & Billingsley, F. F. Behavior games. The Pointer, 1974, 18, 230-231.

The rules for establishing a successful behavior to manage classroom behaviors are presented in this article.

Articles in Chapters or Books

Eaton, M. D. & Lovitt, T. C. Achievement tests vs. direct and daily measurement. In G. Semb (Ed.), Behavior analysis and education - 1972. Lawrence, Kansas: University of Kansas Press, 1972, Pp. 78-87.

The use of achievement test scores for the purpose of placement, communication, or evaluation are challenged in this article. Direct and daily measurement procedures are offered as an alternative method of assessing performance.

Lovitt, T. C. & Eaton, M. D. Oh! that this too too solid flesh would melt:
Direct and daily measurement hath cometh (The erosion of achievement tests).
In N. Bartel and S. Axelrod (Eds.), The handbook for special education
research. CEC Publication, 1974, in press.

Arguments are presented for the use of alternative assessment strategies
than achievement tests. Data are presented to support each argument.

Working Papers

1. Eaton, M. & O'Connell, S. The improvement of performance on daily math assignments through a free choice contingency.

The study investigates the effects of a "free choice" contingency on the math performance of a six year old boy. Results show that the learner consistently took less time to finish his math assignment during the free choice contingency phase than during baseline.

2. Craig, J. The effects on oral reading rate of two reinforcements given at various schedules.

The study investigates the effects on oral reading rates of various reinforcers. Results indicate that for the 16 year old male subject, appropriate reinforcers did motivate the learner to read faster, more accurately, and more consistently. In addition, the study supports findings of Kirkwood and Smelser (1971) which stated that the higher the pinpointed contingency was set the higher the corresponding rate would be. The study also points out that reinforcers must be changed or varied often to prevent boredom and to retain the reinforcer as a motivating force.

3. Billingsley, F. & Smelser, S. A group contingency system: An analysis of component effects.

Two experiments involving the manipulation of group contingency system components were performed with special class pupils. Experiment 1 indicated that tallying the occurrence of inappropriate behaviors on a chalk board and verbalizing teacher-desired limits were ineffective in reducing the frequency of inappropriate behaviors. The application of a punishing contingency upon surpassing limits, however, was found to reduce behavior frequency to a level approximating the limits and limit reduction appeared to increase the variability with which behaviors occurred. Experiment 2 replicated the occurrence of limit approximation and variability increase when limits were further reduced.

4. Hedges, M. J. A project to investigate acquisition and maintenance of spelling words by pupils held to criteria for one, two and three days.

This study was designed to ascertain the optimal number of days a child should perform at criteria on spelling words in order to achieve mastery. Two subjects, ages nine and ten, were held to a criteria of 100% accuracy over one,

two and three days for separate lists of words. After the subjects had met criteria a second goal of the research was to examine any generalization to lists of similar words. The results indicate that three days' performance at criteria may be desirable for maintenance. In some instances the subjects did generalize spelling patterns to lists of similar words. However, due to the brevity of the maintenance phases and the variability of data on the generalization lists, further research is suggested before conclusive statements can be made.

5. Billingsley, F. An examination of the adequacy of non-continuous data.

This study examined the extent to which median slope lines of progress (trend lines) and median rates obtained from frequent, but non-continuous, classroom correct rate data would approximate those obtained from data collected on every available class day. When trend lines and median rates based upon the first 11 days of the original phases were compared with trend and median scores for the same phases with every third and other datum point omitted, a high degree of agreement was observed between trends and between median rates. In the case of trends, however, slightly lower measures of agreement resulted from the omission of every other datum point.

6. Bramer, K. The effect of reduction of problems per page in accelerating arithmetic performance.

The study investigates the effects of reduction of problems per page on the math performance of a nine year old girl. Results of the eight-week study show that by reducing the number of problems per page, correct responses accelerated and error responses decelerated. The study reveals that the subject completed more problems during the reduction phase than during baseline; the number of problems presented on each page decreased but the total number of problems worked increased.

7. Eaton, M. & Swenson, A. An investigation of the difference in maintenance rates of addition probes of pupils held to criteria for one, two or three days.

This study was designed to ascertain empirically if there is an optimal number of days to hold a pupil to criteria on math probes in terms of maintenance rates. The subject of this study was a 12 year old mentally retarded boy. The data indicated that maintenance rates were better in terms of accuracy and speed when the child was held to criteria for two or three consecutive days before entering a maintenance phase. Although there was little difference in maintenance rates between two and three day criteria requirements, the two day requirement was far superior in terms of the number of days necessary to reach criteria during the acquisition phases.

8. Lynch, V. The effects of varied contract rates on math performance.

This study examined an existing technique, the contract rate system, for increasing the academic productivity of a pupil to a proficiency or mastery

level. The results of this study indicate that setting a contract rate produced a rate of responding which approximated the set rate.

9. Gentry, D., Eaton, M., Gardebring, J., & Kohnstamm, L. Three projects:
The influence of drill on oral reading.

Project 1: One practice often employed by teachers in an attempt to improve a child's reading is to have him read a word list containing part or all of the words in a selection before actually reading that selection orally. In this project the teacher compared the effects on a pupil's reading performance of three different tactics: 1) orally drilling on a word list to a desired rate; 2) orally drilling on the word lists; and 3) not reading a word list. Results report that reading performance was superior with drill at a desired rate of 40 words per minute on a word list than drill having no desired rate or to no drill.

Project 2: Project two investigates the influence of drilling only new words before actually reading the passage. In addition the project evaluates the relative effects of learning to a criterion rate on the drill exercise compared to drill with no criterion performance specified. Results indicate that the pupil's performance under the no drill condition was inferior to drill conditions. The data show no discernible difference between conditions where drill procedures were completed with no criterion performance and where the subject was required to read a practice paragraph to a criterion correct rate of 80 words per minute.

Project 3: Project three examines the influence on oral reading rate of drill on all words versus drill on new and error words. The results of this study with a 12 year old boy indicate that not only was drill on new and error words as effective as drill on all words, but was actually more effective.

10. Clennon, S. & Eaton, M. The effect of pre-practice on acquisition of sight vocabulary.

The results of this study which investigated the effects of pre-practice on the acquisition of sight vocabulary indicate that a practice session accompanied with correct and error feedback produced efficient acquisition of sight vocabulary which generalized to other contexts. Pre-practice with immediate correct and error feedback was found to be influential in acquiring a greater sight vocabulary. In addition, the data indicate that continued practice of previously unknown words will generalize to different reading material.

11. Lynch, V. & Eaton, M. Applied behavior analysis of the influence of pre-viewing on oral reading rates.

The study utilizes applied behavior analysis techniques to experimentally assess previewing strategies and their influence on the oral reading rates of a learning disabled student. Results indicate correct rate scores were influenced by all types of previewing with gains in fluency of over 20 words per minute. Error rate, however, improved under the previewing conditions only when it was accompanied by feedback.

12. Taga, S. The effects and side effects of pre-reading comprehension questions and controlling the type of accuracy of comprehension and oral reading rates.

Recent investigations have reported that the manipulations of subsequent events have increased academic performance. The results of this study revealed that contingencies on attending increased attending behavior, but not the amount of work accomplished. The reverse also held true. Contingencies placed on the work accomplished increased work, but not attending. Combined contingencies on attending and work accomplished increased both behaviors.

13. Eaton, M. & Feldman, A. The influence of self-directed and teacher-directed flashcard drill on performance in basic add facts.

The study evaluates the influence of self-administered flashcards versus teacher-administered flashcards on acquisition and rate of responding on basic add facts of a nine year old learning disabled girl. Results indicate that flashcard drill on basic add facts were functional in improving the student's performance. The self-administered flashcards, however, remediated only the error rate and did not help increase fluency. The authors hypothesize that teacher-administered drill may have been more influential on correct rate because, unlike the self-administered drill sessions, the teacher asked for a new response immediately after she had given feedback on the previous answer. Also, the teacher-administered drill added an extra minute of drill time to each session which may have been the crucial variable.

14. Bennett, P. A comparison of programmed and guided-discovery instruction on acquisition rate in mathematics.

This study sought to assess the influence of two different instructional methods on acquisition rate of new mathematics material. Subject 1 received programmed instruction prior to a one-minute probe on add-carry problems of specific class type, whereas Subject 2 participated in a Montessori manipulative discovery game. Pre-probe instruction in subtract-borrow problem classes reversed the instructional treatments received by the subjects. Results for both subjects favor the bead manipulation instruction in accelerating rate of correct responses. Errors decelerated more rapidly in the bead program for Subject 2.

15. Bauerle, L. & Murakami, P. An initial program to teach the preparation of simple foods to the mildly retarded.

This paper presents 1) a data collection system for use in the measurement of food preparation skills; 2) data on acquisition and retention for three students learning nine non-recipe breakfast foods; and 3) an analysis of errors made in preparation. In addition, an initial food presentation sequence based on the project's data is included.

16. Clennon, S. Using school activities to train special education students for employment.

To be published in Teaching Exceptional Children, 1975. See annotated entry under Articles in Professional Journals.

17. Swenson, C. The reduction of disruptive classroom behavior through the systematic application of rate limit reduction within a group consequence system.

This study examined the effects of the systematic rate limit reductions on a variety of inappropriate classroom behaviors. Arranged events were awarded contingent upon group or team behavior rates. A negative punishment group contingency involving the loss of extra gym or wood working shop time was employed and held contingent upon a team's rate of responding daily. Four objectives were investigated: 1) the efficacy of systematic rate limit reduction in decreasing the rate of classroom inappropriate behavior; 2) the similar or differential effects upon behavior of the punishment consequence across teams and individuals; 3) the feasibility of extending limit times from a short period of day to the entire day; and 4) the advantages of a group consequence in relation to specific and group academic achievements.

18. Billingsley, F. A comparison of pupil performance under constant and variable interval conditions.

Using five special class pupils as subjects, this study investigated rate of responding under classroom conditions which would result in either constant or variable "record floors." During each experimental session, subjects performed in geography or mathematics programmed texts under one of three conditions: a variable work interval condition; a constant work interval condition with a timer on the subject's desk; or a constant work interval condition with the timer out of the subject's sight. Conditions were rotated daily and reinforcement contingencies varied among subjects. It was found that four of the five subjects emitted a higher correct response rate under constant than under variable conditions with no appreciable reduction in accuracy. The fifth subject performed slightly better under variable conditions.

19. Billingsley, F. & Adams, G. An analysis of pupil performance under constant interval and constant assignment conditions.

This study investigated the performance of two special class pupils on long division problems under two constant interval conditions and one constant assignment condition. Using a reversal design (A-B-A₂-E-A₃), pupil performance was examined during phases which: 1) the pupil was timed for five minutes with a desk timer; 2) a constant amount of material was presented and time was allowed to vary; 3) the pupil was timed for five minutes by the manager using a stop watch. A comparison of mean correct and error rates, accuracy percentages, and lines-of-progress indicated that, while the performance of one subject was facilitated under the constant interval condition in which the desk timer was employed, the other subject displayed depressed performance under that condition. On the basis of the contrast of these findings with those obtained by other workers, additional systematic replication was recommended.

20. Billingsley, F. & Swenson, C. An intrasample analysis of reading performance in programmed texts.

The purposes of this investigation were to compare selected short interval data to those obtained from a total 15 minute sample of work in programmed

reading texts and to examine trends in performance which might occur across and within the total sample. Analysis of the data gathered during the study indicated that:

1. Fifteen minute correct rate trends obtained for performance in the materials employed were not invariably flat; however, whether or not overall progress was observed, trends calculated for the first and last portions of the total sample often resulted in progress changes of considerable magnitude.

2. Whereas trends for the correct rates of most subjects accelerated during the first seven minutes, those during the last seven minutes most frequently decelerated.

3. As in the case of trends for correct rates, error trends across 15 minute samples were not necessarily flat, and sizable progress changes between trends within samples occurred.

4. Error trends during the first and last seven minutes were generally accelerative and, when acceleration of error trends occurred, they most frequently corresponded to decelerating correct trends.

21. Swenson, C. Precision teaching need not be a data recording nightmare.

This study, involving eight pre-adolescent learning disabled boys, sought to determine the time saving advantages in data measurement of pupil correction of academic performance. Three phases were implemented to gather dependent measures in relation to changes in data recording responsibilities. During baseline, the teacher's aide spent an average of 71 minutes daily in correcting and recording pupil performances. Throughout subsequent intervention phases (reading and math self-correction), the amount of time involved by the teacher's aide was reduced to 54.8 and 41 minutes respectively. As compared to baseline data, these reductions represented an overall decrease in teacher time of 42%.

22. Eaton, M., Lovitt, T.C., Sayre, E., & Lynch, V. Applied behavior analysis of the influence of previewing on oral reading rates.

Applied behavior analysis techniques were used to assess the influence of various previewing tactics on the oral reading performance of five elementary and one secondary aged pupils. The previewing tactics assessed were: oral previewing with feedback of errors; oral previewing without feedback of errors; silent previewing; and previewing by listening to a teacher on tape. The data obtained daily in oral reading indicated that the effects of previewing tactics were often very specific; some influenced only correct rate and others caused changes in both correct and error rates.

23. Eaton, M. & Haisch, L. A comparison of the effects of new vs. error word drill on reading performance.

Applied behavior analysis techniques were used to assess the influence of two types of word drill on the reading performance of six primary aged learning disabled children: drill on new words and drill on error words.

The data indicate that drill is an effective procedure to improve oral reading performance and that for most children drill on error words is superior to drill on new words. Furthermore, the data illustrate how teachers can use an applied behavior analysis methodology to select the most appropriate teaching procedures for the children in their classes.

24. Craig, J. The use of imitation and questions in training two speech deficient children to use complete sentences.

Two intermediate aged pupils were the subjects of a project which used imitation and questioning to teach them to respond in complete sentences. Specific questions were asked about picture cards and only complete sentences were counted correct and were reinforced. The results showed that both students did learn to use certain sentence forms, but that in both cases generalization did not occur to a great enough degree to improve their classroom language.

25. Billingsley, F. & Smelser, S. A group approach to classroom management: The behavior game.

Intermediate aged pupils were the subjects of a study in group behavior management. The findings indicate that the systematic application of a consequence which involves the loss of valued activities can be effective in reducing the frequency of undesirable classroom behaviors and that a tangible consequence is a necessary component of this type of behavior game.

26. Billingsley, F. Eating program for the severely mentally retarded.

This study broke down the task of independent dining skills which would enable the subjects to learn and demonstrate acceptable standards of dining room conduct and that they perform dining tasks in an efficient and effective manner.

28. Liberty, K. A. The non-effect of practice on the retention of spelling words learned to criterion.

This study examines the effects of practice on the retention of spelling words learned to criterion. The difference between drill and practice as being defined: drill is the directed repetition of specific responses to be learned and practice is the learned response utilized in solving problems requiring that response as well as others of a similar or dissimilar nature. Of the four subjects studied, two were performing at about the same level of spelling at the start of this study, and two were working at a much lower level of spelling. Despite the differences in levels of performance of the four subjects, the data indicate that practice had little, if any, effect on retention of spelling.

29. Gentry, D., Adams, G., & Hazel, L. The influence of viewing charts and self-charting on pupil's oral reading performance.

The purpose of this study was to ascertain, for eight different children, the influence on reading rates of two different self-management interventions: viewing their own oral reading charts and charting their own reading rates.

An equally important goal was to teach the children to chart and to become more personally involved in the use of data. Median performances, correct trends, or error trends considered separately do not indicate that self-charting or viewing their charts had a beneficial effect on pupil performance. Only when the relationship between correct and error trends (improvement ratio) is considered does one of the experimental conditions, self-charting, appear superior to other conditions.

30. Fox, S. A method for collecting data to demonstrate the effects of teacher behaviors on pupil performance: A pilot study.

One of the most significant variables which will affect pupil performance is teacher behaviors. The author presents data from a pilot study which tests the use of a data collection tool designed to evaluate the effects of teacher-pupil interactions.

31. Veilleux, C. An investigation of pupil performance to determine the effectiveness of massed versus distributed drill in the acquisition of beginning math facts.

A project was designed to analyze the effectiveness of a massed versus a distributed drilling technique prior to the administration of mathematics probe sheets--the tools used to determine the effectiveness of the procedures. From the data it cannot accurately be said which method is best for teaching beginning math facts. The massed drill and probe technique succeeded in exposing the student to as much material as possible. But the distributed approach resulted in consistency of performance across phases.

32. Zander, M. Combined fixed ratio reinforcement schedule with drill to increase academic correct rate.

This study assessed the effects of combining a fixed ratio reinforcement schedule with drill on correct rate of saying short letter sounds. The subject, a seven year old boy, was given a raisin every time he correctly paired a letter sound with its appropriate letter symbol. Results of this study showed that the combination of a fixed ratio reinforcement schedule and drill was effective in increasing correct rate of saying letter sounds. The results also indicate that a similar procedure might prove fruitful in other academic areas for this subject.

33. Lynch, V. Effects of stable vs. accelerating contract rates on mathematics performance.

This study attempted to find a contingency system which would insure student progress and success while concurrently being easily manageable by teachers. Experiment I showed that subject A's highest median rate occurred during a stable contract rate phase. However, in Experiment II with subject B, this didn't hold true. Because of problems inherent in this study no conclusions can be drawn as to the comparative efficacy of the contract rate systems under consideration.

34. Brush, E. & Gray, D. Development of eye contact in interaction with unfamiliar adults in a moderately retarded child.

This study was conducted to determine whether the eye contact of an eight year old moderately retarded girl could be accelerated through contingency control. Results of this study indicate that it was possible to bring the subject's eye contact behavior under the control of positive reinforcement contingencies of several types, including verbal cues, primary reinforcers, and subsequent shaping techniques. No attempt was made to achieve generalization of this behavior outside the experimental training session, and the data shows that virtually none occurred.

35. Gargagliano, C. Effects of massed vs. distributed drill practice on acquisition and maintenance of basic sight words.

This study investigated the effects of massed versus distributed practice conditions on the learning and retention of basic sight words. The subjects were three children with learning disabilities. Practice was conducted by the manager presenting a subject with five or ten sight words, each on a flashcard. Distributed practice consisted of five one-minute practice sessions while massed practice consisted of one five-minute session. Each subject was assigned two sets of flashcards, one to be practiced under the distributed practice conditions, another under the massed practice conditions. A probe on each set was administered toward the end of the school day. After acquisition, the subjects were tested twice a week for maintenance. Results showed the distributed practice to be more effective for overall learning. The results did not conclusively indicate which practice condition was more favorable for the maintenance of the sight words that the student learned to read.

36. Liberty, K. Adverse effects of self-correction on subject's mathematics rates.

This study attempted to look at pupil correction of material to determine if this procedure facilitated progress in comparison with the usual routine of teacher correction of material. The results indicate that teacher correction immediately following completion of the work will facilitate performance when compared to pupil correction of his own work.

37. McGuigan, C. Four studies investigating the effects of routine and novel drill on acquisition and proficiency rates of learning disabled boys.

Study I was designed and implemented to research the effects of routine and novel drill on the acquisition rates of 12 pupils learning the Manual Communication Alphabet (MCA). Four groups were formed with three pupils in each. Two of the groups were taught routinely (i.e., with the same materials and in a consistent manner) and the two others received novel instruction (i.e., varying instructions and varying techniques). In addition, one routine group and one novel group received feedback. They were told after each session the number of correct and incorrect formations they had made. The results of Study I indicated that the effects of routine drill with feedback were superior to the effects of routine drill without feedback and novel drill with and without feedback.

In Study II one pupil was chosen from the routine drill, no feedback group of Study I. An A-B-A design program was implemented to check the effects of drill types once the pupil had progressed through the acquisition stage of learning. Study II shows that the different types of drill had little effect on the performance level of the pupil once the skill was acquired. However, the data indicated a detrimental effect on error responses when novel drill was introduced in the second phase. This increase in error responses during the novel drill phase supports the hypothesis that novel drill has a tendency to increase error responses when the task is not at a proficient level.

Study III: The results of this multi-baseline study indicated that a pupil who had attained a steep line of progress in Part I for correct responses under routine drill conditions did better in terms of line of progress under novel drill conditions when learning the symbols for manual communication (a similar, but more meaningful task than the MCA). However, errors were at a higher rate in the novel drill condition than in routine drill (supporting Studies II and IV). The change in effectiveness of the drill types in this study may be caused by two circumstances: 1) the level of meaningfulness of the task to be learned, and 2) the close relationship between this task and the one taught directly preceding it.

Study IV: Again a multi-baseline type design was used for cross comparison of data. The results indicated that routine and novel drill were both effective in accelerating correct responses on writing numerals 1-50. However, routine drill did result in marked improvement in performance in both correct and error responses when the pupil was asked to write numerals 51-100.

38. Snowden, J. Effects of reinforcement on the counting skills of a retarded girl.

In this project the principles of operant conditioning and shaping were applied to improve a child's counting skills. The reinforcement used in this study motivated the subject to count by 5's and 10's accurately reaching her set goals and, therefore, accomplished its objectives. Reinforcement variations were used to prevent satiation along with other procedures of instruction (for example, flashcard drill and the language master) which enabled the subject to speedily reach her goals and objectives.

39. Hazel, L. Accuracy vs. accuracy plus rate used as criteria in a mathematics program.

Two students of similar mathematical ability were given identical math sheets in addition and subtraction in an attempt to determine whether accuracy or accuracy plus rate was more effective when used as criteria in an acquisition-retention situation. One student was required to reach only an accuracy criteria before moving on to the next level, the other student was required to reach a rate as well as accuracy criteria. Other factors contributing to acquisition and providing interventions included flash cards presented after the timed sequence and flash cards presented prior to the timing. Post-test results indicated the student working to rate plus accuracy retained more information than the student working to accuracy alone.

40. Suta, C. & Weaver, Z. Review of statistical tests used in selected applied behavior analysis studies.

In this review the use of traditional parametric and non-parametric statistical tests in the area of applied behavior analysis are explored.

41. Finholt, B. Applied behavior analysis studies of self-management in the classroom.

In this review self-management studies pertaining to classroom behaviors are reviewed.

42. Liberty, K. Effects of flashcard drill on oral identification of social sight vocabulary.

This study investigated the use of a commonly-employed instructional procedure, flashcard drill, on the acquisition, mastery, and maintenance of a basic vocabulary skill. For both subjects, the demonstration (pronunciation) of the words by the instructor and the repeated presentation of the material (drill) together facilitated skill acquisition, mastery, and maintenance.

43. Zander, M. The effects of lesson reduction on academic behavior of a primary pupil.

This experiment was designed to test the effects of contingent reinforcement combined with smaller work amounts on correct rate of basic math facts. In order to increase this rate the subject was given half the amount of math facts he had usually been asked to perform, plus he was given a calendar chart and allowed to place stars on those days where he reached the stated goal. The results showed that, although larger amounts of work, coupled with contingent reinforcement, was effective in increasing correct rate, the smaller amounts of work at one time, combined with contingent reinforcement, was most effective in increasing correct rate.

44. Baird, P. Effects of adult attention contingencies on fighting behaviors of two male siblings.

Fighting behaviors in two male subjects ages 8 and 10 increased when the mother began working and attending school. As the previously-used procedure of ignoring fights proved ineffective, the parents decided to make mother's attention contingent on no fights. This adult attention contingency substantially decreased the number and duration of fights.

45. Christensen, S. The effects of self-marking on an inappropriate classroom behavior.

This study employed pupil self-marking on a tally form as an intervention to decrease the socially inappropriate self-stimulating behavior of a 12 year old girl. The subject was asked to mark a tally sheet at her desk each time the behavior occurred. If the behavior occurred and the subject failed to mark the tally sheet, a teacher cue was given. The results indicate self-marking was effective in reducing the undesirable behavior.

46. Eaton, M. Decision making rules and tools.

In a systematic outline some rules for making decisions from rate and percent data are presented. Included are discussions of 1) medians; 2) lines of progress, slopes or trends; 3) start and end rates; 4) minimum 'celeration lines; 5) minimum performance levels; 6) minimum days at criteria performance; and 7) record floors.

47. Fox, S. Methods for establishing aims (desired rate objectives).

In a systematic outline, seven procedures for establishing aims or desired rates for preacademic and academic skills are delineated. These include: 1) previous performance; 2) adult to child proportional formula; 3) peer comparison; 4) functional analysis; 5) normative data guidelines; 6) intersection of a known, desired rate and desired 'celeration rate; and 7) record ceiling.

48. Eaton, M. Placement in curricular materials.

This brief narrative reports an appropriate method for placing learners in reading materials (basal texts). This method suggests that the teacher take samples directly from the materials she/he has on hand, and from these data derive an indication of how the child performs in each reader. The described method is efficient and not costly. Research with three basal series is presented.

49. Granger, D. The effects of self-recording upon household behavior.

This study investigated the efficacy of self-management upon a male adult's household behavior. Results show that the principle of self-management was effective in increasing the number of household behaviors initiated by the subject.

Slide Tape Presentations

Eaton, M. D. & Haisch, L. New vs. error word drill.

This slide tape presentation presents data from a multi-baseline, multi-subject research project investigating the comparative effects of drill on new words and drill on error words. For most children drill on error words produced greater gains in fluency and accuracy than did the new word drill.

Eaton, M. D. & Lovitt, T. C. Achievement tests vs. direct, daily measurement.

This slide tape presentation presents an argument for using direct, daily measurement for placement, communication, and evaluation purposes instead of traditional standardized tests. The arguments are supported with data from several children.

Hansen, C. & Eaton, M. Not all stories are equal (But some are more equal than others).

Data from four studies are compiled to demonstrate the impact of the material changes on pupils' ability to read in basal texts. Four factors were investigated: format, familiarity, sequencing, and phonemic difficulty. Specific suggestions are made to enable teachers to improve reading instruction.

McGuigan, C. The effects of novel and routine drill on the acquisition and proficiency rates of learning disabled students.

The data from four studies are presented which demonstrate the comparative effects of novel and routine drill procedures on the acquisition and proficiency rates of students learning a new skill. For most pupils, routine drill consistently produced better results in reducing error rates and increasing correct rates during acquisition than novel drill. During proficiency stages of learning the drill procedures which produced the best results seemed to vary from child to child.

Weaver, Z., Smyth, J., Rinke, C., & Eaton, M. Placement, programming, and pool.

The procedures for the use of the Academic and Social Behavior Assessment Kit are presented in this slide tape presentation. Two pupils are followed through the steps of assessment, program planning, placement in the classroom, and implementation of programs. In addition some hints about data collection and individualization of instruction in a large class are presented.

TEAM II

MAJOR CONCLUSIONS: FINDINGS

Team II has been involved over the last few years in investigating procedures which will expedite the efficient assessment, placement, remediation, evaluation, and return to school settings of handicapped children. Some of the elements of the referral, remediation, and reintegration process which Team II has studied are indicated below.

1. A measurement system which will give educators the necessary information to make good decisions about the effects of instructional, curricular, and measurement variables on their pupils' progress toward proficiency performance. Team II has investigated the adequacy of non-continuous data, the use of self-management procedures for handicapped children, and developed a series of data rules and a data analysis tool for use by classroom teachers who are currently using daily measurement procedures.
2. An information storage and retrieval system which enables administrators to retrieve precise information about any pupil and evaluate how efficiently he is progressing toward performance levels necessary for successful reintegration. Many of the components of this computerized system are currently in use and enable administrators to help teachers make appropriate decisions about their pupils' programs.
3. The development of the Academic and Social Behavior Assessment Kit which allows for a) accurate assessment and placement of children upon referral; b) expedient reporting to school districts of pupil progress; and c) procedures for collecting data to monitor the child's success once he is returned to a regular setting.

4. Procedures for establishing long-range criteria for each student and measures of proficiency performance at each intermediate step toward the long-range goal.

5. Precise and efficient instructional and management procedures which allow for the rapid remediation of the child's academic and social problems. The body of literature on traditional instructional procedures when reviewed neither provides empirical evidence to support the use of many of the commonly used instructional procedures, nor delineates how or when these procedures should be used. Team II has investigated some of these procedures (drill, fading, cues, practice, feedback, previewing, whole-part learning). These studies taken together provide some general conclusions which have implications for classroom teachers:

- a. Drill is a successful method for improving a child's performance on many academic tasks.
- b. The type of drill which will prove the most successful will probably be related to the phase of the learning hierarchy that the child is in. Routine drills are more likely to produce better results during acquisition whereas novel drills may help the child gain proficiency and generalize the skill to new areas.
- c. Drill on errors generally produces better results than drill on new material.
- d. Feedback is an important component of drill procedures.
- e. Part learning is superior to whole learning for children with previous histories of instructional failure.
- f. The opportunity to preview material improves pupil performance.

g. Permanent cues are an effective procedure to use to improve the performance of children who are in an acquisition stage.

h. Some children seem to have "optimal learning capacities," that is, some pupils have a definite limit to the amount of information they can successfully process at one time. If instruction is geared to this level, more learning will occur over time and generalization will be better.

This summary does not cover all the conclusions of the research that Team II has conducted. To do so would take more than a few pages. Further details of the research are presented in the attached annotated bibliography.

TEAM II

IMPACT OF NIE-SPONSORED WORK

The impact of the NIE-sponsored research done by Team II is best illustrated by the response to workshop presentations by teachers in the field.

Although still in a draft form, the Spelling Program has already been implemented in three public school classrooms in the Seattle area and the feedback from teachers has been enthusiastic.

Teachers in the Renton School District are planning to use the Academic and Social Behavior Assessment Kit both as an assessment tool and as an evaluative tool for their Title I funding.

Teachers in Seattle and Sydney, Australia, who attended workshops where research from the NIE project were presented, write to say that they have many of the procedures recommended on the basis of NIE-sponsored research in their classrooms and are pleased with the results.

Requests for the working papers come in from all over the United States and many teachers say that the research results done through this grant are more relevant to their classroom problems than the methods courses they took while training.

4. Practitioner Products: To determine if this section is appropriate for your project, consult the definitions on pp. 1-2 of the Guidelines for NIE Product Catalog Entries. Products included would be: curriculum materials, administrator/teacher training materials, replicable models, test and measurement instruments, catalogs, guidelines, etc. If the project has multiple products please supply the information, on separate sheets, for each product. Also, if the status of product components differs, complete a separate set of pages for each component as well as each product.

A. Product Name: DATA DECISIONS TEMPLATE

Component name (if status of product components differs):

B. Type of Product (Check all that apply)

- ☐ Curriculum materials for students
- ☐ Administrator/teacher training or development materials
- ☒ Tests or measurement instruments
- ☐ Replicable models
- ☐ Other, please specify (catalogs, guidelines, handbooks, resource guides, etc.)

C. Product's Developmental Status (Check all that will apply by November 30, 1975)

- ☒ Early development complete (design, prototypes or first drafts, pilot tests)
- ☐ Field (operationally ready) forms of the product complete (original or revised product forms that are sufficiently complete to allow them to be used in a field setting where the developer's presence is not continually required to make them work)
- ☒ Revised forms are complete, making the product suitable for release through a publisher or on any basis
- ☐ Necessary implementation aids completed (teacher guides, step-by-step implementation suggestions, trouble shooting suggestions, orientation materials, etc.)
- ☐ Postpublication revisions completed (errors have been corrected or product has been updated or improved after initial publication)
- ☐ User adaptations have been documented (special user groups have transformed the product to meet their unique needs or constraints)
- ☐ Other, please specify

D. Developmental Costs of the Product to Date

Please give approximate estimates of costs ($\pm 15\%$ range acceptable), including such activities as planning, evaluation, dissemination to trial sites, overhead costs, etc.

	<u>Research and Development Costs</u>	<u>Dissemination and Utilization Costs</u>
OE Funds	\$ _____	_____
NIE Funds	\$ <u>2,200.00</u>	<u>\$1,500.00</u>
Other ^{1/} Funds	\$ _____	_____
TOTAL	\$ <u>2,200.00</u>	<u>\$1,500.00</u>

E. Product's Evaluation Status (Check all that will apply by November 30, 1975)

- ☐ Marketing or feasibility studies completed
- ☒ Small-scale field tests of practicability, transportability, or replicability completed (e.g., studies that might answer the question: Can a teacher use this product without major intervention by the developer?)
- ☐ Small-scale, controlled tests of effectiveness (e.g., tests that would answer questions related to product effects by controlling for the effects of other variables or circumstances that might have produced the same results or by performing followup studies of these pilot or field test product users)
- ☐ Large-scale replications in a number of sites to confirm the practicability, transportability, and replicability of the product, as well as to generally confirm the findings for a range of target users and verify previous findings
- ☐ Followup studies of the impact of the product's implementation or of product improvement several months or years after the product had been released and was no longer under the developer's control
- ☐ Other, please specify _____

^{1/} If you have any way of estimating it, please indicate the "leverage" effect your project has had in generating other funds, for example, expenditures for schools to buy or install the product, contributions by foundations to development or dissemination. If the situation is complex, a summary breakdown would be helpful.

F. Distribution Status (Check all that will apply by November 30, 1975)

- ☐ Interim version released and is available either on an inhouse basis (e.g., with a revolving fund) or through a temporary printing arrangement
- ☐ A search is underway for an external publisher
- ☒ A final version is available on an inhouse basis
- ☐ A search for an external publisher has been concluded; a publisher has been identified but a contract has not been signed
- ☐ A search for an external publisher has been concluded and satisfactory publishing arrangements have been made
- ☐ A search for an external publisher has been concluded, but a publisher was not secured and it seems unlikely that satisfactory external arrangements will be made
- ☒ The product is on the market and available for sale
- ☐ The product is available on a loan or rental basis (from publisher, National Audio Visual Center, etc.)
- ☐ The product is available from ERIC (microfiche or hard copy)
- ☐ Other, please specify

G. Dissemination Status (Check all that will apply by November 30, 1975)

- ☐ Informational and/or promotional materials available (brochures, catalogs, sample materials, etc.)
- ☐ Informational and/or promotional materials have been distributed on a national basis--reaching at least 25 percent of the potential market
- ☐ Informational or promotional briefings have been held across the country (for example, 10 or more briefings to potential audiences: at conventions, specially arranged introductions, or to personnel in State education agencies)
- ☐ Several major field demonstrations have been held (for example, the product has been installed in several schools around the country and arrangements have been made in the area of the demonstration for visitors to be brought to the site, shown the product in use, and talk with users)

_____ Large-scale field testing has occurred that served as an initial marketing device for the product among early adopters

X _____ Product available on trial basis at no or minimum cost to user

_____ Other, please specify

H. Implementation Assistance Status (Check all that will apply by November 30, 1975)

X _____ A cadre of trained consultants, trainers, or other appropriate personnel is available to assist people in the use of the product

_____ Training or other technical assistance mechanisms available have been used by over 10 percent of the current users of the product

_____ If you believe that training or technical assistance is unnecessary for the use of the product, please check this line

_____ Other, please specify

I. Product Sales

. Total dollar sales to March 1975 (estimate) \$ 115.70 No. of years (1) reversed against cost

. Estimated total number of product units sold to March 1975. Define a unit as the largest selling product item, i.e., student materials rather than teacher's manual. 89 No. of years (1)

. Estimated total individual users from target population (teachers if teacher training product; students if product is primarily designed for student use, etc.) to March 1975. Specify target population reference group. 150 No. of years (1)

. Estimated universe of possible individual target population users in the United States for 1976 all teachers using direct-daily measurement No. of years (

. At a later time would it be possible to break these figures down into annual sales and users? _____ Yes X No

J. User Sites

On the attached page, please check the States where the product has been used in more than one local district. If you have an existing directory of purchasers or users, computer lists, lists of product use by Congressional district, or other formal devices for tracking users, we would like to know of them and receive a copy of the directory or sample pages from the computer list. We don't require complete lists but rather a sense of the extent of the information.

(Please check one)

- ☐ Published user list available
- ☐ Unpublished, inhouse user list available
- ☐ No user list available, but could be developed
- ☒ User list would be impossible to develop

K. Product Impact

On a separate page, please give unique anecdotal evidence of the product's impact. (Keep it short, but this is particularly important information which we need for Congressional testimony.) Also identify the location of incident and the Congressional district in which it occurred.

PRODUCT IMPACT

Reaction to the Data Decision Template has been very favorable. Teachers who use daily measurement in their classrooms have expressed pleasure at the usefulness of the tool.

PRODUCT USER SITES

Please check the States (or the District of Columbia, Puerto Rico, and Virgin Islands) where the product has been used in more than one local district. Also, if possible note the fact that product was used in a large urban district (New York City, Chicago, Los Angeles, etc.) within that State.

☐ ALABAMA
☐ ALASKA
☐ ARIZONA
☐ ARKANSAS
☐ CALIFORNIA
☐ COLORADO
☐ CONNECTICUT
☐ DELAWARE
☐ FLORIDA
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☐ LOUISIANA
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☐ MARYLAND
☐ MASSACHUSETTS
☐ MICHIGAN
☐ MINNESOTA
☐ MISSISSIPPI
☐ MISSOURI
☐ MONTANA
☐ NEBRASKA

☐ NEVADA
☐ NEW HAMPSHIRE
☐ NEW JERSEY
☐ NEW MEXICO
☐ NEW YORK
☐ NORTH CAROLINA
☐ NORTH DAKOTA
☐ OHIO
☐ OKLAHOMA
☐ OREGON
☐ PENNSYLVANIA
☐ RHODE ISLAND
☐ SOUTH CAROLINA
☐ SOUTH DAKOTA
☐ TENNESSEE
☐ TEXAS
☐ UTAH
☐ VERMONT
☐ VIRGINIA
☒ WASHINGTON
☐ WEST VIRGINIA
☐ WISCONSIN
☐ WYOMING
☐ PUERTO RICO
☐ DISTRICT OF COLUMBIA
☐ VIRGIN ISLANDS
☐ OTHER, PLEASE SPECIFY
☒ Australia
☒ British Columbia, Canada

NIE PRODUCT: DATA DECISIONS TEMPLATE

DEVELOPER/AUTHOR: Experimental Education Unit, WJ-10
Child Development and Mental Retardation Center
University of Washington
Seattle, Washington 98195

Marie Eaton, Team II Coordinator
Norris G. Haring, Project Director

NARRATIVE DESCRIPTION

Many of the decision tools for teachers and researchers using semi-logarithmic chart paper to display their data are combined on one template. The templates combine a slope finder for ease in calculating the slope of a line of progress; a percent meter for ease in converting a correct/error rate combination to a percent score; a rate plotter which enables a data collector to accurately and swiftly chart data without lengthy division processes; a minimum 'celeration decision tool; and other features which help the data collector use the standard charting conventions. The template is in durable plastic with letters and numbers which will not fade with age or use.

SUBJECT AREAS

Not applicable.

INTENDED USERS AND BENEFICIARIES

The template is designed to be used by any researcher, teacher, or classroom aide who uses semi-logarithmic paper to display their daily classroom data.

GOALS OR PURPOSES

The purpose of the template is to facilitate the data taking and data decision processes.

PATTERNS OF USE

Not applicable.

ASSESSMENT PROVISIONS

Not applicable.

TIME REQUIREMENTS

Not applicable.

IMPLEMENTATION PROCEDURES

Not applicable.

MATERIALS, EQUIPMENT AND PERSONNEL REQUIREMENTS

Not applicable.

ASSURANCES AND CLAIMS

Not applicable.

AVAILABILITY

Present Status

The template is currently available and has been distributed for use to teachers and researchers within the Experimental Education Unit, within the Seattle area, and in Sydney, Australia.

Distributor

The Data Decisions Template is available from the developer upon request to:

Experimental Education Unit, WJ-10
Child Development and Mental Retardation Center
University of Washington
Seattle, Washington 98195

INFORMATION CURRENT AS OF APRIL 1975.

4. Practitioner Products: To determine if this section is appropriate for your project, consult the definitions on pp. 1-2 of the Guidelines for RIE Product Catalog Entries. Products included would be: curriculum materials, administrator/teacher training materials, replicable models, test and measurement instruments, catalogs, guidelines, etc. If the project has multiple products please supply the information, on separate sheets, for each product. Also, if the status of product components differs, complete a separate set of pages for each component as well as each product.

A. Product Name: ACADEMIC AND SOCIAL BEHAVIOR ASSESSMENT KIT

Component name (if status of product components differs):

B. Type of Product (Check all that apply)

- ☐ Curriculum materials for students
☐ Administrator/teacher training or development materials
☒ Tests or measurement instruments
☐ Replicable models
☐ Other, please specify (catalogs, guidelines, handbooks, resource guides, etc.)

C. Product's Developmental Status (Check all that will apply by November 30, 1975)

- ☒ Early development complete (design, prototypes or first drafts, pilot tests)
- ☒ Field (operationally ready) forms of the product complete (original or revised product forms that are sufficiently complete to allow them to be used in a field setting where the developer's presence is not continually required to make them work)
- ☐ Revised forms are complete, making the product suitable for release through a publisher or on any basis
- ☒ Necessary implementation aids completed (teacher guides, step-by-step implementation suggestions, trouble shooting suggestions, orientation materials, etc.)
- ☒ Postpublication revisions completed (errors have been corrected or product has been updated or improved after initial publication)
- ☐ User adaptations have been documented (special user groups have transformed the product to meet their unique needs or constraints)
- ☐ Other, please specify

D. Developmental Costs of the Product to Date

Please give approximate estimates of costs ($\pm 15\%$ range acceptable), including such activities as planning, evaluation, dissemination to trial sites, overhead costs, etc.

	<u>Research and Development Costs</u>	<u>Dissemination and Utilization Costs</u>
OE Funds	\$ 10,900.00	
NIE Funds	\$ 25,444.00	\$7,474.00
Other <u>1/</u> Funds	\$ 5,000.00	
TOTAL	\$ 41,344.00	\$7,474.00

E. Product's Evaluation Status (Check all that will apply by November 30, 1975)

- ☐ Marketing or feasibility studies completed
- ☒ Small-scale field tests of practicability, transportability, or replicability completed (e.g., studies that might answer the question: Can a teacher use this product without major intervention by the developer?)
- ☐ Small-scale, controlled tests of effectiveness (e.g., tests that would answer questions related to product effects by controlling for the effects of other variables or circumstances that might have produced the same results or by performing followup studies of these pilot or field test product users)
- ☒ Large-scale replications in a number of sites to confirm the practicability, transportability, and replicability of the product, as well as to generally confirm the findings for a range of target users and verify previous findings
- ☐ Followup studies of the impact of the product's implementation or of product improvement several months or years after the product had been released and was no longer under the developer's control
- ☐ Other, please specify

1/ If you have any way of estimating it, please indicate the "leverage" effect your project has had in generating other funds, for example, expenditures for schools to buy or install the product, contributions by foundations to development or dissemination. If the situation is complex, a summary breakdown would be helpful.

-82-

F. Distribution Status (Check all that will apply by November 30, 1975)

- ☐ Interim version released and is available either on an inhouse basis (e.g., with a revolving fund) or through a temporary printing arrangement
- ☐ A search is underway for an external publisher
- ☒ A final version is available on an inhouse basis
- ☐ A search for an external publisher has been concluded; a publisher has been identified but a contract has not been signed
- ☐ A search for an external publisher has been concluded and satisfactory publishing arrangements have been made
- ☐ A search for an external publisher has been concluded, but a publisher was not secured and it seems unlikely that satisfactory external arrangements will be made
- ☒ The product is on the market and available for sale
- ☐ The product is available on a loan or rental basis (from publisher, National Audio Visual Center, etc.)
- ☐ The product is available from ERIC (microfiche or hard copy)
- ☐ Other, please specify

G. Dissemination Status (Check all that will apply by November 30, 1975)

- ☒ Informational and/or promotional materials available (brochures, catalogs, sample materials, etc.)
- ☐ Informational and/or promotional materials have been distributed on a national basis--reaching at least 25 percent of the potential market
- ☐ Informational or promotional briefings have been held across the country (for example, 10 or more briefings to potential audiences: at conventions, specially arranged introductions, or to personnel in State education agencies)
- ☐ Several major field demonstrations have been held (for example, the product has been installed in several schools around the country and arrangements have been made in the area of the demonstration for visitors to be brought to the site, shown the product in use, and talk with users)

- _____ Large-scale field testing has occurred that served as an initial marketing device for the product among early adopters
- _____ Product available on trial basis at no or minimum cost to user
- _____ Other, please specify

II. Implementation Assistance Status (Check all that will apply by November 30, 1975)

- _____ A cadre of trained consultants, trainers, or other appropriate personnel is available to assist people in the use of the product
- _____ Training or other technical assistance mechanisms available have been used by over 10 percent of the current users of the product
- X If you believe that training or technical assistance is unnecessary for the use of the product, please check this line
- _____ Other, please specify

I. Product Sales

- . Total dollar sales to March 1975 (estimate) \$ 770.00 No. of years (reversed against cost
- . Estimated total number of product units sold to March 1975. Define a unit as the largest selling product item, i.e., student materials rather than teacher's manual. 5 No. of years (
- . Estimated total individual users from target population (teachers if teacher training product; students if product is primarily designed for student use, etc.) to March 1975. Specify target population reference group. 20 No. of years (
- . Estimated universe of possible individual target population users in the United States for 1976 10/per school district No. of years (
- . At a later time would it be possible to break these figures down into annual sales and users? Yes X No

J. User Sites

On the attached page, please check the States where the product has been used in more than one local district. If you have an existing directory of purchasers or users, computer lists, lists of product use by Congressional district, or other formal devices for tracking users, we would like to know of them and receive a copy of the directory or sample pages from the computer list. We don't require complete lists but rather a sense of the extent of the information.

(Please check one)

- ☐ Published user list available
- ☐ Unpublished, ~~in~~ use user list available
- ☒ No user list available, but could be developed
- ☐ User list would be impossible to develop

K. Product Impact

On a separate page, please give unique anecdotal evidence of the product's impact. (Keep it short, but this is particularly important information which we need for Congressional testimony.) Also identify the location of incident and the Congressional district in which it occurred.

PRODUCT IMPACT

The Academic and Social Behavior Assessment Kit has had a significant impact even in the year since the prototype was completed. School districts in Washington, Idaho, Montana, and Australia use the kit routinely to assess problem children, and districts in Washington and Australia are considering the use of the kit as an assessment tool to monitor district-wide change for reporting to funding agencies.

PRODUCT USER SITES

Please check the States (or the District of Columbia, Puerto Rico, and Virgin Islands) where the product has been used in more than one local district. Also, if possible note the fact that product was used in a large urban district (New York City, Chicago, Los Angeles, etc.) within that State.

☐ ALABAMA
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☐ HAWAII
☒ IDAHO
☐ ILLINOIS
☐ INDIANA
☐ IOWA
☐ KANSAS
☐ KENTUCKY
☐ LOUISIANA
☐ MAINE
☐ MARYLAND
☐ MASSACHUSETTS
☐ MICHIGAN
☐ MINNESOTA
☐ MISSISSIPPI
☐ MISSOURI
☒ MONTANA
☐ NEBRASKA

☐ NEVADA
☐ NEW HAMPSHIRE
☐ NEW JERSEY
☐ NEW MEXICO
☐ NEW YORK
☐ NORTH CAROLINA
☐ NORTH DAKOTA
☐ OHIO
☐ OKLAHOMA
☐ OREGON
☐ PENNSYLVANIA
☐ RHODE ISLAND
☐ SOUTH CAROLINA
☐ SOUTH DAKOTA
☐ TENNESSEE
☐ TEXAS
☐ UTAH
☐ VERMONT
☐ VIRGINIA
☒ WASHINGTON
☐ WEST VIRGINIA
☐ WISCONSIN
☐ WYOMING
☐ PUERTO RICO
☐ DISTRICT OF COLUMBIA
☐ VIRGIN ISLANDS
☐ OTHER, PLEASE SPECIFY
☒ AUSTRALIA
☒ BRITISH COLUMBIA

NIE PRODUCT: ACADEMIC AND SOCIAL BEHAVIOR ASSESSMENT KIT

DEVELOPER/AUTHOR: Experimental Education Unit, WJ-10
Child Development and Mental Retardation Center
University of Washington
Seattle, Washington 98195

Zane Weaver,
Norris G. Haring, Project Director

NARRATIVE DESCRIPTION

The Academic and Social Behavior Assessment Kit was developed at the Experimental Education Unit in an effort to provide an assessment tool which would meet the following requirements:

1. Systematically assesses performance levels in specific skill areas;
2. Can be administered by untrained personnel;
3. Provides relevant information for lesson planning;
4. Can be used for continuous measurement of performance;
5. Does not require long periods of time for administration; and
6. Individual probes in selected skill areas can be used separately.

The Kit is efficient and economical in terms of the time required for assessment, the cost of testing materials, and the ease of administration. No special training is required to follow the procedures described in the directions.

The Kit was designed to be used to pinpoint academic and social deficits in relation to peer skill levels by administering one-minute timed probes in the pre-academic and academic skills areas of reading, math, and writing and to monitor a pupil's educational advancement in these areas.

There are two parts to the academic assessment. The first is a packet of 5"x8" screening probes which are given untimed. These probes correspond numerically to the 8-1/2"x11" one-minute timed probes. The screening probes can save examiner time by eliminating the need to give some of the one-minute probes on skills the pupil already possesses.

The second part consists of 8-1/2"x11" one-minute timed probes. When selected by the screening instrument, these probes are given once a day for five consecutive days. Research has shown that performance rates vary from day to day so rates taken over a five-day period give a more accurate picture of a pupil's abilities. These rates should be compared to "average" peer performance rates on the same probes in order to establish goals or aims for remediation of those skills where the performance rates are below peer rates. Administration of the screening probes takes approximately twenty minutes. Administration of the five-day timed probes will vary with the number of probes selected.

The Social Behavior Assessment is also taken over a five-day period. Instructions are provided for pinpointing inappropriate and appropriate behaviors for observation during a specific time period during the school day. A five-day record sheet is also provided for recording observations.

The screening probes and 8-1/2"x11" color probes are laminated for repeated use. The other 8-1/2"x11" probes and data collection sheets are printed on index paper to be used as duplication masters.

SUBJECT AREAS

The first 21 probes are pre-academic probes which cover:

1. Alphabet and number recall;
2. Matching number to set;
3. Number sequencing;
4. Matching (symbols, letters, groups);
5. Auditory and visual discrimination of letters and words; and
6. Fine motor skills (tracing, drawing between lines, and copying).

Academic probes 22 through 40 cover number and letter recognition, phonics, printing, and cursive writing skills, oral reading rate, and basic math skills through division.

INTENDED USERS AND BENEFICIARIES

The Assessment Kit is designed to be used by teachers, teachers' aides, or other school personnel, e.g., counselors, psychologists, etc., in the classroom. It may also be administered by a cross-age tutor or a volunteer parent. The Kit is intended to be used with students, regardless of chronological age, who possess the required entry skills. The pre-academic and academic probes are particularly appropriate for average pupils and pupils with moderate handicaps, or specific learning disabilities.

Pupil Entry Behaviors Required for Academic Assessment:

The pupil must be able to:

1. Communicate with the examiner;
2. Understand the concepts of same and different;
3. Use a pencil or grease pencil; and
4. Point.

GOALS OR PURPOSES

The purpose of the Kit is to identify precisely each child's skill strengths and deficits in both academic and social behaviors and to monitor his progress in these areas.

PATTERNS OF USE

Probes for particular skill areas, such as addition facts, may be given at frequent intervals, e.g., every week, to assess the effectiveness of specific teaching procedures or materials. Probes may also be given at quarterly intervals to summarize a pupil's progress.

SCREENING PROVISIONS

The Screening Probes for the Academic Assessment Battery include three to four problems from each of the forty Academic Assessment Battery probes. The Screening Probes indicate whether or not the pupil has the skills necessary for administration of the Academic Assessment Battery and if so, which academic probes should be given.

ASSESSMENT PROVISIONS

A Progress Report data sheet is included for recording scores obtained on repeated administrations of academic probes and provides an overview of each pupil's individual progress.

A collection of peer data is recommended in establishing academic objectives for the student, which are relevant to the particular classroom setting. A Data Analysis Sheet includes a column for peer scores, as well as referred pupil scores.

Definitions of the types of errors are printed on the back of each probe sheet. An Error Analysis Sheet is provided for noting, for both the referred pupil and his peer, the type of errors which occurred, the frequency of their occurrence, and omissions. The error analysis is to be completed for each academic assessment probe administered.

TIME REQUIREMENTS

The initial screening requires from ten to twenty minutes, depending on examiner knowledge of the child's abilities and limitations. For example, if the pupil is in a first-grade classroom, there would be no need to present the multiplication and division probes, thus reducing the testing time. The timed academic assessment probes which are to be given for three to five consecutive days will require varying amounts of time depending on the total number of probes which are to be given. They are selected through use of the screening tool. Social data may be taken during a certain class period, if the frequency of occurrence is high for the pinpointed behaviors. It should be taken for the entire day if the behaviors occur infrequently.

IMPLEMENTATION PROCEDURES

The screening probes included are ready for immediate use. However, all other materials including data summary sheets and instructions for each one-minute probe, need to be duplicated. These pages of the Kit are intended to serve as master copies for whatever copying and duplicating methods are available to the user, e.g., thermofax/ditto or electrostencil/mimeo.

MATERIALS, EQUIPMENT AND PERSONNEL REQUIREMENTS

Required items	Quantity needed	Cost per item	Replacement rate
Screening probes	1 set per examiner	\$10.00	Reusable
Administration and Scoring Instructions Social and academic assessment probe masters for duplication (8-1/2x11")	1 set per department	\$43.98	Reusable
Academic probes To be duplicated by examiner	5 copies of each probe per pupil	Undetermined	Reusable

Stop watch or clock or watch with sweep second hand	1 per examiner	Undetermined	Reusable
Marking pen	1 per examiner	Undetermined	Reusable

Personnel Required for Implementation

The oral pre-academic and academic screening probes and timed probes must be given individually. The written probes may be given by one examiner to a group of pupils at a time. Objective instructions for administration, scoring, and error analysis are given and can be followed by teacher aides, volunteers, or other paraprofessionals as well as teachers.

ASSURANCES AND CLAIMS

The Academic and Social Behavior Assessment Kit has been used with approximately fifty pupils at the Experimental Education Unit. It has been used for intake assessment and quarterly monitoring of pupils' progress for one to two years for these pupils. Initial analysis of the data obtained indicated that the Kit provided information relevant to program planning (areas of pupil strengths and weaknesses) and to progress and return placement of pupils to public school programs.

The Kit is currently in use in the following public school settings: Tacoma, Washington, program for severely handicapped; Vancouver, British Columbia, Canada, University of British Columbia Special Education Department; Boise, Idaho, Learning Disabilities Project; Belgrade, Montana, Montana Regional Services. There are no indications of harmful effects. There are no forms of social bias in the Kit. The general instructions suggest assessment of peer performance for comparison in order to set goals and objectives in planning remedial programs. However, after aims have been established progress checks with the Kit are compared only to the pupil's own baseline performance and progress is assessed on this basis.

Data and feedback from users of the Kit will be collected to determine the Kit's usefulness in terms of assessing pupil strengths and deficits relevant to public school classroom functioning and to make revisions if necessary. Performance data will be used to establish normative performance ranges for each academic probe and will be provided to users of the Kit for reference.

AVAILABILITY

Present Status

Twenty copies of the Kit were produced in 1974. An additional 100 copies containing revisions are being produced at this time and will be available for public school use by summer 1975.

Distributor

Further information is available upon request to:

Experimental Education Unit, WJ-10
Child Development and Mental Retardation Center
University of Washington
Seattle, Washington 98195

INFORMATION CURRENT AS OF APRIL 1975.

4. Practitioner Products: To determine if this section is appropriate for your project, consult the definitions on pp. 1-2 of the Guidelines for NIE Product Catalog Entries. Products included would be: curriculum materials, administrator/teacher training materials, replicable models, test and measurement instruments, catalogs, guidelines, etc. If the project has multiple products please supply the information, on separate sheets, for each product. Also, if the status of product components differs, complete a separate set of pages for each component as well as each product.

A. Product Name: WEEKLY MEAL SEQUENCE PROGRAM

Component name (if status of product components differs):

B. Type of Product (Check all that apply)

- ☒ Curriculum materials for students
- ☐ Administrator/teacher training or development materials
- ☐ Tests or measurement instruments
- ☐ Replicable models
- ☐ Other, please specify (catalogs, guidelines, handbooks, resource guides, etc.)

C. Product's Developmental Status (Check all that will apply by November 30, 1975)

- ☒ Early development complete (design, prototypes or first drafts, pilot tests)
- ☐ Field (operationally ready) forms of the product complete (original or revised product forms that are sufficiently complete to allow them to be used in a field setting where the developer's presence is not continually required to make them work)
- ☐ Revised forms are complete, making the product suitable for release through a publisher or on any basis
- ☐ Necessary implementation aids completed (teacher guides, step-by-step implementation suggestions, trouble shooting suggestions, orientation materials, etc.)
- ☐ Postpublication revisions completed (errors have been corrected or product has been updated or improved after initial publication)
- ☐ User adaptations have been documented (special user groups have transformed the product to meet their unique needs or constraints)
- ☐ Other, please specify

D. Developmental Costs of the Product to Date Teacher time only.

Please give approximate estimates of costs ($\pm 15\%$ range acceptable), including such activities as planning, evaluation, dissemination to trial sites, overhead costs, etc.

	<u>Research and Development Costs</u>	<u>Dissemination and Utilization Costs</u>
OE Funds	\$ _____	_____
NIE Funds	\$ 800.00	_____
Other ^{1/} Funds	\$ _____	_____
TOTAL	\$ 800.00	_____

E. Product's Evaluation Status (Check all that will apply by November 30, 1975)

- _____ Marketing or feasibility studies completed
- _____ Small-scale field tests of practicability, transportability, or replicability completed (e.g., studies that might answer the question: Can a teacher use this product without major intervention by the developer?)
- _____ Small-scale, controlled tests of effectiveness (e.g., tests that would answer questions related to product effects by controlling for the effects of other variables or circumstances that might have produced the same results or by performing followup studies of these pilot or field test product users)
- _____ Large-scale replications in a number of sites to confirm the practicability, transportability, and replicability of the product, as well as to generally confirm the findings for a range of target users and verify previous findings
- _____ Followup studies of the impact of the product's implementation or of product improvement several months or years after the product had been released and was no longer under the developer's control
- _____ Other, please specify _____

1/If you have any way of estimating it, please indicate the "leverage" effect your project has had in generating other funds, for example, expenditures for schools to buy or install the product, contributions by foundations to development or dissemination. If the situation is complex, a summary breakdown would be helpful.

F. Distribution Status (Check all that will apply by November 30, 1975)

- ☒ Interim version released and is available either on an inhouse basis (e.g., with a revolving fund) or through a temporary printing arrangement
- ☐ A search is underway for an external publisher
- ☐ A final version is available on an inhouse basis
- ☐ A search for an external publisher has been concluded; a publisher has been identified but a contract has not been signed
- ☐ A search for an external publisher has been concluded and satisfactory publishing arrangements have been made
- ☐ A search for an external publisher has been concluded, but a publisher was not secured and it seems unlikely that satisfactory external arrangements will be made
- ☐ The product is on the market and available for sale
- ☐ The product is available on a loan or rental basis (from publisher, National Audio Visual Center, etc.)
- ☐ The product is available from ERIC (microfiche or hard copy)
- ☐ Other, please specify

G. Dissemination Status (Check all that will apply by November 30, 1975)

- ☐ Informational and/or promotional materials available (brochures, catalogs, sample materials, etc.)
- ☐ Informational and/or promotional materials have been distributed on a national basis--reaching at least 25 percent of the potential market
- ☐ Informational or promotional briefings have been held across the country (for example, 10 or more briefings to potential audiences: at conventions, specially arranged introductions, or to personnel in State education agencies)
- ☐ Several major field demonstrations have been held (for example, the product has been installed in several schools around the country and arrangements have been made in the area of the demonstration for visitors to be brought to the site, shown the product in use, and talk with users)

- _____ Large-scale field testing has occurred that served as an initial marketing device for the product among early adopters
- _____ Product available on trial basis at no or minimum cost to user
- _____ Other, please specify

II. Implementation Assistance Status (Check all that will apply by November 30, 1975)

- _____ A cadre of trained consultants, trainers, or other appropriate personnel is available to assist people in the use of the product
- _____ Training or other technical assistance mechanisms available have been used by over 10 percent of the current users of the product
- ☒ If you believe that training or technical assistance is unnecessary for the use of the product, please check this line
- _____ Other, please specify

I. Product Sales Not Applicable: No sales to date.

- . Total dollar sales to March 1975 (estimate) \$ _____ No. of years ()
- . Estimated total number of product units sold to March 1975. Define a unit as the largest selling product item, i.e., student materials rather than teacher's manual. _____ No. of years ()
- . Estimated total individual users from target population (teachers if teacher training product; students if product is primarily designed for student use, etc.) to March 1975. Specify target population reference group. _____ No. of years ()
- . Estimated universe of possible individual target population users in the United States for 1976 _____ No. of years ()
- . At a later time would it be possible to break these figures down into annual sales and users? _____ Yes _____ No

J. User Sites

On the attached page, please check the States where the product has been used in more than one local district. If you have an existing directory of purchasers or users, computer lists, lists of product use by Congressional district, or other formal devices for tracking users, we would like to know of them and receive a copy of the directory or sample pages from the computer list. We don't require complete lists but rather a sense of the extent of the information.

(Please check one)

- ☐ Published user list available
- ☐ Unpublished, inhouse user list available
- ☒ No user list available, but could be developed
- ☐ User list would be impossible to develop

K. Product Impact

On a separate page, please give unique anecdotal evidence of the product's impact. (Keep it short, but this is particularly important information which we need for Congressional testimony.) Also identify the location of incident and the Congressional district in which it occurred.

PRODUCT IMPACT

The Weekly Meal Sequence Program is still in development; it has not been widely used as yet. Feedback from users has been good and in-house results show that moderately handicapped pupils are able to learn food preparation skills.

PRODUCT USER SITES

Please check the States (or the District of Columbia, Puerto Rico, and Virgin Islands) where the product has been used in more than one local district. Also, if possible note the fact that product was used in a large urban district (New York City, Chicago, Los Angeles, etc.) within that State.

☐ ALABAMA
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☐ SOUTH CAROLINA
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☐ TENNESSEE
☐ TEXAS
☐ UTAH
☐ VERMONT
☐ VIRGINIA
☒ WASHINGTON
☐ WEST VIRGINIA
☐ WISCONSIN
☐ WYOMING
☐ PUERTO RICO
☐ DISTRICT OF COLUMBIA
☐ VIRGIN ISLANDS
☐ OTHER, PLEASE SPECIFY

X Australia

NIE PRODUCT: WEEKLY MEAL SEQUENCE PROGRAM

A program to teach food preparation skills to the retarded

DEVELOPER/AUTHOR: Experimental Education Unit, WJ-10
Child Development and Mental Retardation Center
University of Washington
Seattle, Washington 98195

Maria White, Head Teacher, Homeliving Area
Marie Eaton, Team II Coordinator
Norris G. Haring, Project Director

NARRATIVE DESCRIPTION

Basic food skills are an important part of everyone's life. They are essential skills to teach to the handicapped as one step on the way to independent living. The Weekly Meal Sequence Program is a comprehensive and detailed program to teach preparation of foods to handicapped children. The program is divided into the following sections: 1) a description of the entry skills which the pupil should have prior to working with the weekly sequence; 2) a checklist of the steps in the sequence; 3) an explanation of each step in the sequence; 4) a series of food preparation task analyses; 5) guidelines for preparing further task analyses; 6) a section on data collection; 7) a section on optional motivational programs; and 8) a mini-program on following directions.

The Weekly Meal Sequence Program takes the learner through all the steps of food preparation, including balanced meal planning, budgeting, menu preparation, shopping, recipe reading, food preparation, serving, and clean up.

This program is easily individualized according to the entry skill level of each pupil. The program is carefully sequenced to take pupils from a level of teacher-directed and guided activities to independent and self-directed food preparation. The recipes are presented in varying levels of difficulty with full-picture recipes for the non-reader.

SUBJECT AREAS

Home economics, basic life skills. The Weekly Meal Sequence Program teaches the skills of basic food preparation.

INTENDED USERS AND BENEFICIARIES

Although designed to be used with the moderately handicapped pupil, aged 10 through adult, the sequence could be useful for those teaching food preparation to pupils of any age or ability. This sequence could be implemented by teachers, aides, or parents.

GOALS OR PURPOSES

1. To be able to plan balanced meals;
2. To budget and shop for necessary food items;
3. To read and follow recipes; and
4. To prepare and serve simple foods.

PATTERNS OF USE

The units of the program are sequential and cumulative, but entry into the sequence is based on pupil ability.

ASSESSMENT PROVISIONS

Student evaluation is built into the program and is a part of the daily activities.

TIME REQUIREMENTS

Because each portion of the program is criterion-referenced, time span depends on pupil entry skills and ability. The program is designed for daily use, 1/2 hour per day.

IMPLEMENTATION PROCEDURES

The Weekly Meal Sequence Program requires access to a kitchen facility and grocery store. No other special equipment is required. Although some of the program can be used in group work, parts are better utilized with individual assessment and teaching for each pupil.

MATERIALS, EQUIPMENT AND PERSONNEL REQUIREMENTS

Required items	Quantity needed	Cost per item	Replacement rate
Fully stocked kitchen facility	1 per school	Varies	Reusable
Weekly Meal Sequence Program	1 per school	Undetermined	Reusable

Summary Cost Information

Because the product is still in draft form, cost information cannot be determined.

Personnel Required for Product Adoption and Implementation

A classroom teacher or parent without special training may use this material.

ASSURANCES AND CLAIMS

Assurances of Harmlessness

The kitchen is a potential site for accidents with low functioning children. Kitchen safety rules have been included in the program and there have been no accidents in the program's initial use.

Assurances of Social Fairness

The program is intended to be used with persons of both sexes. There is no stereotyping of the role of the food preparer.

Claims of Careful Product Development

1. Learner feedback has been consistently used in all revisions of this product.
2. Sound principles of task analysis were used in all program components.
3. Feedback from home economics teachers and specialists have been obtained.

AVAILABILITY

Present Status

This program is now in its second revision and is still being fieldtested at the Experimental Education Unit and home economics classrooms in the Seattle area.

Forthcoming

A revised version for public consumption will be available by Fall 1975.

Distributor

The Weekly Meal Sequence Program will be available in Fall 1975 upon request to:

Experimental Education Unit, WJ-10
Child Development and Mental Retardation Center
University of Washington
Seattle, Washington 98195

INFORMATION CURRENT AS OF APRIL 1975.

4. Practitioner Products: To determine if this section is appropriate for your project, consult the definitions on pp. 1-2 of the Guidelines for NIE Product Catalog Entries. Products included would be: curriculum materials, administrator/teacher training materials, replicable models, test and measurement instruments, catalogs, guidelines, etc. If the project has multiple products please supply the information, on separate sheets, for each product. Also, if the status of product components differs, complete a separate set of pages for each component as well as each product.

A. Product Name: THE SPELLING PROGRAM

Component name (if status of product components differs):

B. Type of Product (Check all that apply)

- ☒ Curriculum materials for students
☐ Administrator/teacher training or development materials
☐ Tests or measurement instruments
☐ Replicable models
☐ Other, please specify (catalogs, guidelines, handbooks, resource guides, etc.)

C. Product's Developmental Status (Check all that will apply by November 30, 1975)

- ☒ Early development complete (design, prototypes or first drafts, pilot tests)
- ☒ Field (operationally ready) forms of the product complete (original or revised product forms that are sufficiently complete to allow them to be used in a field setting where the developer's presence is not continually required to make them work)
- ☐ Revised forms are complete, making the product suitable for release through a publisher or on any basis
- ☐ Necessary implementation aids completed (teacher guides, step-by-step implementation suggestions, trouble shooting suggestions, orientation materials, etc.)
- ☐ Postpublication revisions completed (errors have been corrected or product has been updated or improved after initial publication)
- ☒ User adaptations have been documented (special user groups have transformed the product to meet their unique needs or constraints)
- ☐ Other, please specify

D. Developmental Costs of the Product to Date Teacher time only.

Please give approximate estimates of costs ($\pm 15\%$ range acceptable), including such activities as planning, evaluation, dissemination to trial sites, overhead costs, etc.

	<u>Research and Development Costs</u>	<u>Dissemination and Utilization Costs</u>
OE Funds	\$ _____	_____
NIE Funds	\$ 3,800.00	\$300.00
Other <u>1/</u> Funds	\$ _____	_____
TOTAL	\$ 3,800.00	\$300.00

E. Product's Evaluation Status (Check all that will apply by November 30, 1975)

- _____ Marketing or feasibility studies completed
- _____ Small-scale field tests of practicability, transportability, or replicability completed (e.g., studies that might answer the question: Can a teacher use this product without major intervention by the developer?)
- _____ Small-scale, controlled tests of effectiveness (e.g., tests that would answer questions related to product effects by controlling for the effects of other variables or circumstances that might have produced the same results or by performing followup studies of these pilot or field test product users)
- _____ Large-scale replications in a number of sites to confirm the practicability, transportability, and replicability of the product, as well as to generally confirm the findings for a range of target users and verify previous findings
- _____ Followup studies of the impact of the product's implementation or of product improvement several months or years after the product had been released and was no longer under the developer's control
- _____ Other, please specify

1/If you have any way of estimating it, please indicate the "leverage" effect your project has had in generating other funds, for example, expenditures for schools to buy or install the product, contributions by foundations to development or dissemination. If the situation is complex, a summary breakdown would be helpful.

F. Distribution Status (Check all that will apply by November 30, 1975)

- ☒ Interim version released and is available either on an inhouse basis (e.g., with a revolving fund) or through a temporary printing arrangement
- ☐ A search is underway for an external publisher
- ☐ A final version is available on an inhouse basis
- ☐ A search for an external publisher has been concluded; a publisher has been identified but a contract has not been signed
- ☐ A search for an external publisher has been concluded and satisfactory publishing arrangements have been made
- ☐ A search for an external publisher has been concluded, but a publisher was not secured and it seems unlikely that satisfactory external arrangements will be made
- ☐ The product is on the market and available for sale
- ☐ The product is available on a loan or rental basis (from publisher, National Audio Visual Center, etc.)
- ☐ The product is available from ERIC (microfiche or hard copy)
- ☐ Other, please specify

G. Dissemination Status (Check all that will apply by November 30, 1975)

- ☐ Informational and/or promotional materials available (brochures, catalogs, sample materials, etc.)
- ☐ Informational and/or promotional materials have been distributed on a national basis--reaching at least 25 percent of the potential market
- ☐ Informational or promotional briefings have been held across the country (for example, 10 or more briefings to potential audiences: at conventions, specially arranged introductions, or to personnel in State education agencies)
- ☐ Several major field demonstrations have been held (for example, the product has been installed in several schools around the country and arrangements have been made in the area of the demonstration for visitors to be brought to the site, shown the product in use, and talk with users)

- ☐ Large-scale field testing has occurred that served as an initial marketing device for the product among early adopters
- ☐ Product available on trial basis at no or minimum cost to user
- ☐ Other, please specify

H. Implementation Assistance Status (Check all that will apply by November 30, 1975)

- ☐ A cadre of trained consultants, trainers, or other appropriate personnel is available to assist people in the use of the product
- ☐ Training or other technical assistance mechanisms available have been used by over 10 percent of the current users of the product
- ☒ If you believe that training or technical assistance is unnecessary for the use of the product, please check this line
- ☐ Other, please specify

I. Product Sales Not applicable

- . Total dollar sales to March 1975 (estimate) \$ _____ No. of years ()
- . Estimated total number of product units sold to March 1975. Define a unit as the largest selling product item, i.e., student materials rather than teacher's manual. _____ No. of years ()
- . Estimated total individual users from target population (teachers if teacher training product; students if product is primarily designed for student use, etc.) to March 1975. Specify target population reference group. _____ No. of years ()
- . Estimated universe of possible individual target population users in the United States for 1976 _____ No. of years ()
- . At a later time would it be possible to break these figures down into annual sales and users? _____ Yes _____ No

J. User Sites

On the attached page, please check the States where the product has been used in more than one local district. If you have an existing directory of purchasers or users, computer lists, lists of product use by Congressional district, or other formal devices for tracking users, we would like to know of them and receive a copy of the directory or sample pages from the computer list. We don't require complete lists but rather a sense of the extent of the information.

(Please check one)

- ☐ Published user list available
- ☐ Unpublished, inhouse user list available
- ☒ No user list available, but could be developed
- ☐ User list would be impossible to develop

K. Product Impact

On a separate page, please give unique anecdotal evidence of the product's impact. (Keep it short, but this is particularly important information which we need for Congressional testimony.) Also identify the location of incident and the Congressional district in which it occurred.

PRODUCT IMPACT

The Spelling Program, even in its initial draft form, was eagerly adopted by public school teachers to whom it was presented. Feedback from teachers has been good and many are adopting the procedures to other curricular areas.

PRODUCT USER SITES

Please check the States (or the District of Columbia, Puerto Rico, and Virgin Islands) where the product has been used in more than one local district. Also, if possible note the fact that product was used in a large urban district (New York City, Chicago, Los Angeles, etc.) within that State.

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☐ TENNESSEE
☐ TEXAS
☐ UTAH
☐ VERMONT
☐ VIRGINIA
☒ WASHINGTON
☐ WEST VIRGINIA
☐ WISCONSIN
☐ WYOMING
☐ PUERTO RICO
☐ DISTRICT OF COLUMBIA
☐ VIRGIN ISLANDS
☐ OTHER, PLEASE SPECIFY
☒ Australia
☒ British Columbia

NIE PRODUCT: THE SPELLING PROGRAM

DEVELOPER/AUTHOR: Experimental Education Unit, WJ-10
Child Development and Mental Retardation Center
University of Washington
Seattle, Washington 98195

Corrine McGuigan, Educator
Norris G. Haring, Project Director

NARRATIVE DESCRIPTION

The Spelling Program is an individualized program designed to allow students to practice and acquire spelling words at their own rates. The program includes directions for: 1) initial placement; 2) secondary placement; 3) appropriate selection of spelling words; 4) determination of "optimal learning capacities;" 5) criteria for adding new words; 6) review procedures; 7) daily data collection; 8) maintenance; and 9) samples of data sheets, work sheets, test sheets, and data displays.

The program is designed to: 1) allow a student to work with the maximum number of words that he/she is able to handle; 2) through appropriate placement procedures allow a pupil to work only with words that he/she does not know, thus reducing the amount of time children often spend studying material they already know; and 3) allow a pupil to see success immediately--first by elimination of a word from the study/test list as soon as the pupil demonstrates the ability to spell that word and second, by involving the pupil in viewing and/or charting the cumulative number of known words.

Although a certain sequence of spelling words is suggested in the program, the format could be used with any standard spelling curriculum.

Finally, the program can be made nearly teacher-independent through the use of a language master or peer tutors.

SUBJECT AREAS

The procedures described in the Spelling Program could be adopted to any grade level spelling material. The introduction of words to be learned could be in any sequence the teacher chooses.

INTENDED USERS AND BENEFICIARIES

This program is prepared for any student who has the long-range goal of being able to communicate accurately in a written fashion. It is also suited to a learner who is 15 years old (plus) and beginning "spelling" for the first time or a learner whose final placement will be a sheltered workshop. For these learners, the program format would be used with basic survival words (i.e., name, address, parents' name, etc.) as the curricular matter rather than the more traditional spelling curriculum.

The goal of the Spelling Program is to efficiently and effectively teach children to spell. In addition, the program is intended to insure maintenance of spelling skills once they are acquired.

PATTERNS OF USE

The Spelling Program is easily adapted to any sequence of words the teacher chooses. The program is individualized and when used with a language master or peer tutor can be largely self-managed by pupils.

ASSESSMENT PROVISIONS

Detailed instructions are given for adequate initial and secondary placement of students so that they are working on material which is new to them. In addition, daily data collection procedures are detailed which allow both pupil and teacher to monitor progress.

TIME REQUIREMENTS

If the program is managed by the pupils, as recommended, the only teacher time involved would be checking the practice and test sheets. This program would be used as part of the standard spelling curriculum.

IMPLEMENTATION PROCEDURES

All the procedures for implementation of this program are included in the program package.

MATERIALS, EQUIPMENT AND PERSONNEL REQUIREMENTS

<u>Required items</u>	<u>Quantity needed</u>	<u>Cost per item</u>	<u>Replacement rate</u>
Program manual	1 per teacher	Undetermined	Reusable
Language master (recommended only)	1 per room	Undetermined	Reusable

Since any individualized program can be expensive in teacher time, this program was designed to be used with a language master or peer tutors or aides.

ASSURANCES AND CLAIMS

The Spelling Program has been used successfully in three public school classrooms in the Seattle area, as well as with numerous students at the Experimental Education Unit. There has been no evidence of harmful effects of any kind. On the contrary, pupils who previously had maintenance scores of 40% under traditional spelling programs are now scoring 90% on maintenance tests.

AVAILABILITY

Present Status

The program exists in an experimental edition only. A limited number of copies are available at this time for teachers outside the EEU who volunteer to test the program with their students and to provide feedback on their experience using the program. The program will be revised as necessary based on data and feedback from these teachers.

Distributor

Further information is available upon request to:

Experimental Education Unit, WJ-10
Child Development and Mental Retardation Center
University of Washington
Seattle, Washington 98195

INFORMATION CURRENT AS OF APRIL 1975.

Attachment 1

DISSEMINATION STATUS REQUEST

Data collected through this form will be used as management information by the School Practice and Service staff to highlight and summarize the outcomes of projects supervised or funded by NIE* and to facilitate our FY 76 planning. Projects which contributed to the growth of knowledge should describe the types of knowledge generated, the major findings, and anecdotal examples of impact on educational research, policy, or practice (see Section 3, "Knowledge Outcomes"). If the project produced products, a longer format for reporting data has been provided (see Section 4, "Practitioner Products"). If multiple products were developed by a project, status information should be provided for each product separately.

We need this information on every NIE-sponsored product, regardless of its stage of development, unless the product has been completely dropped and is no longer regarded as viable by the developer.

The following outline contains the items of information needed:

1. Official Project Title: A PROGRAM PROJECT FOR THE INVESTIGATION AND APPLICATION OF PROCEDURES FOR ANALYSIS AND MODIFICATION OF BEHAVIOR OF HANDICAPPED CHILDREN - Team III
2. Contract/Grant No.: OEG-0-70-3916
3. Knowledge Outcomes (theories, research conclusions, etc.; complete only if there were such outcomes)
 - A. Give the number of reports, articles, books, speeches, etc. generated by the project (either during the project or subsequently). A bibliography of published articles would be welcomed in addition.
 - _____ Articles in professional journals
 - _____ Articles in popular news media
 - _____ Articles or chapters in books
 - _____ Books
 - _____ Presentations at professional conventions
 - _____ Other (please describe)
 - B. In a few brief sentences describe the major conclusions or findings that have emerged from your work:
 - C. Give one or two anecdotal examples of the impact your NIE-sponsored work has had on educational research, policy, or practice, including any indication of use that you or others have made of your findings (additional research, modification of educational practice, etc.). (Please type this material on a separate page and attach.)

* Include OE or OEO projects transferred to NIE.

4. Practitioner Products: To determine if this section is appropriate for your project, consult the definitions on pp. 1-2 of the Guidelines for NIE Product Catalog Entries. Products included would be: curriculum materials, administrator/teacher training materials, replicable models, test and measurement instruments, catalogs, guidelines, etc. If the project has multiple products please supply the information, on separate sheets, for each product. Also, if the status of product components differs, complete a separate set of pages for each component as well as each product.

A. Product Name THE LET'S TELL TIME PROGRAM

Component name (if status of product components differs):

B. Type of Product (Check all that apply)

- ☒ Curriculum materials for students
☐ Administrator/teacher training or development materials
☐ Tests or measurement instruments
☐ Replicable models
☐ Other, please specify (catalogs, guidelines, handbooks, resource guides, etc.)

C. Product's Developmental Status (Check all that will apply by November 30, 1975)

- ☒ Early development complete (design, prototypes or first drafts, pilot tests)
☒ Field (operationally ready) forms of the product complete (original or revised product forms that are sufficiently complete to allow them to be used in a field setting where the developer's presence is not continually required to make them work)
☐ Revised forms are complete, making the product suitable for release through a publisher or on any basis
☒ Necessary implementation aids completed (teacher guides, step-by-step implementation suggestions, trouble shooting suggestions, orientation materials, etc.)
☐ Postpublication revisions completed (errors have been corrected or product has been updated or improved after initial publication)
☒ User adaptations have been documented (special user groups have transformed the product to meet their unique needs or constraints)
☐ Other, please specify

D. Developmental Costs of the Product to Date

Please give approximate estimates of costs ($\pm 15\%$ range acceptable), including such activities as planning, evaluation, dissemination to trial sites, overhead costs, etc.

	<u>Research and Development Costs</u>	<u>Dissemination and Utilization Costs</u>
OE Funds	\$ 4,038.00	\$ 712.00
NIE Funds	\$ 8,075.00	1,425.00
Other ^{1/} Funds	\$ 2,200.00	
TOTAL	\$ 14,313.00	\$2,137.00

E. Product's Evaluation Status (Check all that will apply by November 30, 1975)

- ☒ Marketing or feasibility studies completed
- ☒ Small-scale field tests of practicability, transportability, or replicability completed (e.g., studies that might answer the question: Can a teacher use this product without major intervention by the developer?)
- ☒ Small-scale, controlled tests of effectiveness (e.g., tests that would answer questions related to product effects by controlling for the effects of other variables or circumstances that might have produced the same results or by performing followup studies of these pilot or field test product users)
- ☒ Large-scale replications in a number of sites to confirm the practicability, transportability, and replicability of the product, as well as to generally confirm the findings for a range of target users and verify previous findings
- ☐ Followup studies of the impact of the product's implementation or of product improvement several months or years after the product had been released and was no longer under the developer's control
- ☐ Other, please specify

^{1/}If you have any way of estimating it, please indicate the "leverage" effect your project has had in generating other funds, for example, expenditures for schools to buy or install the product, contributions by foundations to development or dissemination. If the situation is complex, a summary breakdown would be helpful.

F. Distribution Status (Check all that will apply by November 30, 1975)

- ☒ Interim version released and is available either on an inhouse basis (e.g., with a revolving fund) or through a temporary printing arrangement
- ☐ A search is underway for an external publisher
- ☐ A final version is available on an inhouse basis
- ☐ A search for an external publisher has been concluded; a publisher has been identified but a contract has not been signed
- ☐ A search for an external publisher has been concluded and satisfactory publishing arrangements have been made
- ☐ A search for an external publisher has been concluded, but a publisher was not secured and it seems unlikely that satisfactory external arrangements will be made
- ☐ The product is on the market and available for sale
- ☐ The product is available on a loan or rental basis (from publisher, National Audio Visual Center, etc.)
- ☐ The product is available from ERIC (microfiche or hard copy)
- ☐ Other, please specify

G. Dissemination Status (Check all that will apply by November 30, 1975)

- ☒ Informational and/or promotional materials available (brochures, catalogs, sample materials, etc.)
- ☐ Informational and/or promotional materials have been distributed on a national basis--reaching at least 25 percent of the potential market
- ☐ Informational or promotional briefings have been held across the country (for example, 10 or more briefings to potential audiences: at conventions, specially arranged introductions, or to personnel in State education agencies)
- ☐ Several major field demonstrations have been held (for example, the product has been installed in several schools around the country and arrangements have been made in the area of the demonstration for visitors to be brought to the site, shown the product in use, and talk with users)

- ☐ Large-scale field testing has occurred that served as an initial marketing device for the product among early adopters
- ☐ Product available on trial basis at no or minimum cost to user
- ☐ Other, please specify

H. Implementation Assistance Status (Check all that will apply by November 30, 1975)

- ☐ A cadre of trained consultants, trainers, or other appropriate personnel is available to assist people in the use of the product
- ☐ Training or other technical assistance mechanisms available have been used by over 10 percent of the current users of the product
- ☒ If you believe that training or technical assistance is unnecessary for the use of the product, please check this line
- ☐ Other, please specify

I. Product Sales

- . Total dollar sales to March 1975 (estimate) \$ _____ No. of years ()
- . Estimated total number of product units sold to March 1975. Define a unit as the largest selling product item, i.e., student materials rather than teacher's manual. _____ No. of years ()
- . Estimated total individual users from target population (teachers if teacher training product; students if product is primarily designed for student use, etc.) to March 1975. Specify target population reference group. _____ No. of years ()
- . Estimated universe of possible individual target population users in the United States for 1976 _____ No. of years ()
- . At a later time would it be possible to break these figures down into annual sales and users? _____ Yes _____ No

J. User Sites

On the attached page, please check the States where the product has been used in more than one local district. If you have an existing directory of purchasers or users, computer lists, lists of product use by Congressional district, or other formal devices for tracking users, we would like to know of them and receive a copy of the directory or sample pages from the computer list. We don't require complete lists but rather a sense of the extent of the information.

(Please check one)

- ☐ Published user list available
- ☒ Unpublished, inhouse user list available
- ☐ No user list available, but could be developed
- ☐ User list would be impossible to develop

K. Product Impact

On a separate page, please give unique anecdotal evidence of the product's impact. (Keep it short, but this is particularly important information which we need for Congressional testimony.) Also identify the location of incident and the Congressional district in which it occurred.

PRODUCT IMPACT

Eight teachers working with 31 students participated in the first phase of fieldtesting the Let's Tell Time Program in the public schools. The teachers reported varying degrees of success with the program, but all found it to be a valuable use of their time and asked to be included in future fieldtesting. A response from a teacher in Granger, Washington, typifies the encouraging feedback received from all the teachers: "The program was a success as far as my class is concerned. I thank you for allowing me to work with it. It's a great program." Another teacher in Calgary, Canada, wrote: "...it has been a program that is worth every minute we have given it. Please include us when you send out the revised program."

PRODUCT USER SITES

Please check the States (or the District of Columbia, Puerto Rico, and Virgin Islands) where the product has been used in more than one local district. Also, if possible note the fact that product was used in a large urban district (New York City, Chicago, Los Angeles, etc.) within that State.

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☐ WISCONSIN
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☐ PUERTO RICO
☐ DISTRICT OF COLUMBIA
☐ VIRGIN ISLANDS
☐ OTHER, PLEASE SPECIFY

NIE PRODUCT: LET'S TELL TIME

DEVELOPER/AUTHOR: Experimental Education Unit, WJ-10
Child Development and Mental Retardation Center
University of Washington
Seattle, Washington

Norris G. Haring, Project Director

NARRATIVE DESCRIPTION

The Let's Tell Time program is a self-contained instructional program to be used by teachers and students. The program teaches telling time from a conventional clock to the nearest whole minute. The student is taught to use the "hour:minute" convention for expressing time as well as commonly accepted phrases such as "half past" and "quarter to." The program is intended to be used with any student who does not know how to use or tell time and who possesses the following entry skills: recognize numbers 1-59; rote count 1-59; write numbers sequentially 1-59; count by 5's to 60; count by 10's to 60; discriminate between red and black. These prerequisite skills are assessed by the pretest included in the teacher's manual. Students are differentially placed in the program based on their pretest data; not all students begin at Lesson 1.

The teacher's manual is self-explanatory and may be used by teachers, para-professionals, or volunteers in the classroom. The lessons are administered on a one-to-one basis and require approximately 15 minutes per student per day. The lessons are presented in a three column format: the teacher's column includes detailed directions and the actual words the teacher says to the student; the student column lists the correct responses expected of the student; the third column, Remediation, indicates recommended procedures to follow if the student does not respond correctly.

In addition to the teacher's manual, the program includes numerous instructional aids, individual student workbooks, and a set of data cards. The teacher demonstrates the procedures specified in the lesson and assists the student to complete the desired student responses. The student writes in the workbook as part of the daily lesson, and the teacher scores correct and error responses on the student's set of data cards.

At the end of each lesson, the teacher figures percent correct scores for the lesson and work sheets and enters these scores on the graphs included in the student's set of data cards. The graph provides the teacher with an overall view of the student's progress in the lessons and the workbook.

SUBJECT AREAS

The Let's Tell Time program consists of 40 lessons which are divided into five sections: clock hand discrimination; the hour hand in isolation; the minute hand to the nearest whole minute, in isolation; time telling using both clock hands; and the use of non-exact phrases for expressing time. The lessons are written in sequence and should be taught in the order presented. However, students are differentially placed in the program based on their pretest data; not all students will begin with Lesson 1.

INTENDED USERS AND BENEFICIARIES

The time program is designed to be used by teachers or paraprofessionals in the classroom. It is intended for students, regardless of chronological age, who possess the required entry skills. In order to insure the effectiveness of the program when used with students who have general or specific learning disabilities, the lessons allow for substantial overlearning and frequent review.

GOALS OR PURPOSES

The terminal goal of the time program is to teach students to read the time from a conventional clock to the nearest whole minute. The purpose is to enable the student to reach this goal in a minimum amount of time, with a minimum amount of student and teacher error.

PATTERNS OF USE

Students for the program are selected on the basis of a pretest which serves two functions. First, the pretest assesses the student's basal skill level. Second, it indicates where the student should be placed in the program, if the need for advanced placement is indicated by the pretest data. The pretest requires 15 minutes to administer and is fully explained in the teacher's manual.

In addition to the pretest and 40 lessons included in the teacher's manual, the time program includes a student workbook and numerous aids. These materials represent a carefully developed and tested set of color and number cues which are gradually faded as the student progresses through the lessons.

ASSESSMENT PROVISIONS

A set of data cards is provided for every student in the Let's Tell Time program. One card corresponds to each lesson or set of work sheets. The correct student responses indicated in the lessons are coded with sequential numbers. These response numbers appear on the data cards for the appropriate lesson. The teacher indicates on the card whether the student responded correctly on the first, second, or third trial. At the end of the lesson, the teacher totals the number of correct and error responses and figures a percent correct score for the lesson and another percent correct score for the work sheets. A student must score 90% correct in order to proceed to the next lesson.

The purpose of the individual sets of data cards is to provide the program developer with data across students on every response indicated in the lessons. If a high percentage of student data indicate difficulty on any one response, that portion of the lesson would be revised to eliminate errors.

TIME REQUIREMENTS

One lesson is administered each school day and may require up to 15 minutes to administer. A student will stay on one lesson for as many days as necessary to meet the criteria for that lesson. The length of time required for a student to complete all 40 lessons will vary, depending on the lesson at which the student begins the program. Allowing for absences and repeated lessons, a teacher should allow a minimum of 60 days to complete the program.

IMPLEMENTATION PROCEDURES

All directions and materials required for implementing this program are included in the program package.

MATERIALS, EQUIPMENT AND PERSONNEL REQUIREMENTS

<u>Required items</u>	<u>Quantity needed</u>	<u>Cost per item</u>	<u>Replacement rate</u>
Teacher's manual	1 per teacher	Undetermined	Reusable
Instructional aids	1 set per room	Undetermined	Reusable
Student workbooks	1 per student	Undetermined	Consumable
Sets of data cards	1 per student	Undetermined	Consumable

Personnel Required for Product Adoption and Implementation

Since one-to-one administration is an expensive educational procedure, the program is designed to be used by trained as well as untrained personnel.

ASSURANCES AND CLAIMS

The Let's Tell Time program has been fieldtested by a limited number of teachers and students in the public schools. As of this time, there have been no indications that the program affects users negatively or perpetuates social biases. The program has thus far proved to be transportable. Further field-testing is needed to provide additional data on the validity of these assurances. The program will be revised to eliminate such shortcomings. It should be noted that the teacher's manual uses the generic "he."

AVAILABILITY

Present Status

The program exists in an experimental edition only. A limited number of copies are available at this time for teachers outside the EEU who volunteer to test the program with their students and to provide feedback on their experience using the program. The program will be revised as necessary based on data and feedback from these teachers.

Distributor

Further information is available upon request to:

Experimental Education Unit, WJ-10
Child Development and Mental Retardation Center
University of Washington
Seattle, Washington 98195

INFORMATION CURRENT AS OF APRIL 1975.

4. Practitioner Products: To determine if this section is appropriate for your project, consult the definitions on pp. 1-2 of the Guidelines for NIE Product Catalog Entries. Products included would be: curriculum materials, administrator/teacher training materials, replicable models, test and measurement instruments, catalogs, guidelines, etc. If the project has multiple products please supply the information, on separate sheets, for each product. Also, if the status of product components differs, complete a separate set of pages for each component as well as each product.

A. Product Name: THE SHOE TIE PROGRAM

Component name (if status of product components differs):

B. Type of Product (Check all that apply)

- ☒ Curriculum materials for students
☐ Administrator/teacher training or development materials
☐ Tests or measurement instruments
☐ Replicable models
☐ Other, please specify (catalogs, guidelines, handbooks, resource guides, etc.)

C. Product's Developmental Status (Check all that will apply by November 30, 1975)

- ☒ Early development complete (design, prototypes or first drafts, pilot tests)
- ☒ Field (operationally ready) forms of the product complete (original or revised product forms that are sufficiently complete to allow them to be used in a field setting where the developer's presence is not continually required to make them work)
- ☐ Revised forms are complete, making the product suitable for release through a publisher or on any basis
- ☒ Necessary implementation aids completed (teacher guides, step-by-step implementation suggestions, trouble shooting suggestions, orientation materials, etc.)
- ☐ Postpublication revisions completed (errors have been corrected or product has been updated or improved after initial publication)
- ☒ User adaptations have been documented (special user groups have transformed the product to meet their unique needs or constraints)
- ☐ Other, please specify

D. Developmental Costs of the Product to Date

Please give approximate estimates of costs ($\pm 15\%$ range acceptable), including such activities as planning, evaluation, dissemination to trial sites, overhead costs, etc.

	<u>Research and Development Costs</u>	<u>Dissemination and Utilization Costs</u>
OE Funds	\$ 4,038.00	\$ 712.00
NIE Funds	\$ 8,075.00	1,425.00
Other ^{1/} Funds	\$ 2,200.00	
TOTAL	\$ 14,313.00	\$2,137.00

E. Product's Evaluation Status (Check all that will apply by November 30, 1975)

- ☒ Marketing or feasibility studies completed
- ☒ Small-scale field tests of practicability, transportability, or replicability completed (e.g., studies that might answer the question: Can a teacher use this product without major intervention by the developer?)
- ☒ Small-scale, controlled tests of effectiveness (e.g., tests that would answer questions related to product effects by controlling for the effects of other variables or circumstances that might have produced the same results or by performing followup studies of these pilot or field test product users)
- ☒ Large-scale replications in a number of sites to confirm the practicability, transportability, and replicability of the product, as well as to generally confirm the findings for a range of target users and verify previous findings
- ☐ Followup studies of the impact of the product's implementation or of product improvement several months or years after the product had been released and was no longer under the developer's control
- ☐ Other, please specify

^{1/}If you have any way of estimating it, please indicate the "leverage" effect your project has had in generating other funds, for example, expenditures for schools to buy or install the product, contributions by foundations to development or dissemination. If the situation is complex, a summary breakdown would be helpful.

F. Distribution Status (Check all that will apply by November 30, 1975)

- ☒ Interim version released and is available either on an inhouse basis (e.g., with a revolving fund) or through a temporary printing arrangement
- ☐ A search is underway for an external publisher
- ☐ A final version is available on an inhouse basis
- ☐ A search for an external publisher has been concluded; a publisher has been identified but a contract has not been signed
- ☐ A search for an external publisher has been concluded and satisfactory publishing arrangements have been made
- ☐ A search for an external publisher has been concluded, but a publisher was not secured and it seems unlikely that satisfactory external arrangements will be made
- ☐ The product is on the market and available for sale
- ☐ The product is available on a loan or rental basis (from publisher, National Audio Visual Center, etc.)
- ☐ The product is available from ERIC (microfiche or hard copy)
- ☐ Other, please specify

G. Dissemination Status (Check all that will apply by November 30, 1975)

- ☒ Informational and/or promotional materials available (brochures, catalogs, sample materials, etc.)
- ☐ Informational and/or promotional materials have been distributed on a national basis--reaching at least 25 percent of the potential market
- ☐ Informational or promotional briefings have been held across the country (for example, 10 or more briefings to potential audiences: at conventions, specially arranged introductions, or to personnel in State education agencies)
- ☐ Several major field demonstrations have been held (for example, the product has been installed in several schools around the country and arrangements have been made in the area of the demonstration for visitors to be brought to the site, shown the product in use, and talk with users)

- ☐ Large-scale field testing has occurred that served as an initial marketing device for the product among early adopters
- ☐ Product available on trial basis at no or minimum cost to user
- ☐ Other, please specify

H. Implementation Assistance Status (Check all that will apply by November 30, 1975)

- ☐ A cadre of trained consultants, trainers, or other appropriate personnel is available to assist people in the use of the product
- ☐ Training or other technical assistance mechanisms available have been used by over 10 percent of the current users of the product
- ☒ If you believe that training or technical assistance is unnecessary for the use of the product, please check this line
- ☐ Other, please specify

I. Product Sales

- . Total dollar sales to March 1975 (estimate) \$ _____ No. of years ()
- . Estimated total number of product units sold to March 1975. Define a unit as the largest selling product item, i.e., student materials rather than teacher's manual. _____ No. of years ()
- . Estimated total individual users from target population (teachers if teacher training product; students if product is primarily designed for student use, etc.) to March 1975. Specify target population reference group. _____ No. of years ()
- . Estimated universe of possible individual target population users in the United States for 1976 _____ No. of years ()
- . At a later time would it be possible to break these figures down into annual sales and users? _____ Yes _____ No

J. User Sites

On the attached page, please check the States where the product has been used in more than one local district. If you have an existing directory of purchasers or users, computer lists, lists of product use by Congressional district, or other formal devices for tracking users, we would like to know of them and receive a copy of the directory or sample pages from the computer list. We don't require complete lists but rather a sense of the extent of the information.

(Please check one)

- ☐ Published user list available
- ☒ Unpublished, inhouse user list available
- ☐ No user list available, but could be developed
- ☐ User list would be impossible to develop

K. Product Impact

On a separate page, please give unique anecdotal evidence of the product's impact. (Keep it short, but this is particularly important information which we need for Congressional testimony.) Also identify the location of incident and the Congressional district in which it occurred.

PRODUCT IMPACT

Eighteen teachers returned data on 25 students as part of the first phase of fieldtesting the Shoe Tie Program in the public schools. Of the 25 students, 12 successfully completed the program in a median of 19 days. Three additional students (two who did not have laced shoes and one confined to a wheelchair) completed Lesson 9 which required that they be able to tie the model shoe. The remaining ten students did not complete the program due to visual or behavior problems and frequent absences. All of the Shoe Tie Program administrators reported that the program was a valuable use of their time and that the careful sequencing of the lessons was a great asset in teaching their students to tie shoes. This positive feedback is supported by the fact that the administrators asked to be included in future fieldtesting of the program. A response from a teacher in Port Angeles, Washington, describes the enthusiasm with which the Shoe Tie Program was received in the first phase of fieldtesting in the public schools: "If this child who has very low academic abilities can successfully complete this program, I feel almost anyone would be successful."

PRODUCT USER SITES

Please check the States (or the District of Columbia, Puerto Rico, and Virgin Islands) where the product has been used in more than one local district. Also, if possible note the fact that product was used in a large urban district (New York City, Chicago, Los Angeles, etc.) within that State.

☐ ALABAMA
☐ ALASKA
☐ ARIZONA
☐ ARKANSAS
☐ CALIFORNIA
☐ COLORADO
☐ CONNECTICUT
☐ DELAWARE
☐ FLORIDA
☐ GEORGIA
☐ HAWAII
☐ IDAHO
☐ ILLINOIS
☐ INDIANA
☐ IOWA
☐ KANSAS
☐ KENTUCKY
☐ LOUISIANA
☐ MAINE
☐ MARYLAND
☐ MASSACHUSETTS
☐ MICHIGAN
☐ MINNESOTA
☐ MISSISSIPPI
☐ MISSOURI
☐ MONTANA
☐ NEBRASKA

☐ NEVADA
☐ NEW HAMPSHIRE
☐ NEW JERSEY
☐ NEW MEXICO
☐ NEW YORK
☐ NORTH CAROLINA
☐ NORTH DAKOTA
☐ OHIO
☐ OKLAHOMA
☐ OREGON
☐ PENNSYLVANIA
☐ RHODE ISLAND
☐ SOUTH CAROLINA
☐ SOUTH DAKOTA
☐ TENNESSEE
☐ TEXAS
☐ UTAH
☐ VERMONT
☐ VIRGINIA
☒ WASHINGTON
☐ WEST VIRGINIA
☐ WISCONSIN
☐ WYOMING
☐ PUERTO RICO
☐ DISTRICT OF COLUMBIA
☐ VIRGIN ISLANDS
☐ OTHER, PLEASE SPECIFY

NIE PRODUCT: THE SHOE TIE PROGRAM

DEVELOPER/AUTHOR: Experimental Education Unit, WJ-10
Child Development and Mental Retardation Center
University of Washington
Seattle, Washington 98195

Norris C. Haring, Project Director

NARRATIVE DESCRIPTION

The Shoe Tie Program is a self-contained teacher's manual which teaches one specific self-help skill--shoe tying. Students for the program are selected on the basis of a pretest which assesses both the entry skills and the target behaviors. Entry skills include the abilities to pinch, pull, and imitate the actions of others.

The program is self-explanatory and may be used by teachers, paraprofessionals, or volunteers in the classroom. The lessons are administered on a one-to-one basis and require approximately ten minutes per student per day. The lessons are presented in a three-column format: the teacher's column indicates detailed directions and the actual words the teacher says to the student; the student column lists the correct responses expected of the student; the third column, Remediation, indicates recommended procedures to follow if the student does not respond correctly.

Students are differentially placed in the program based on their pretest data; not all students begin at Lesson 1.

In each lesson, the student learns to complete a new step in addition to steps mastered in previous lessons. The teacher demonstrates the procedures specified in the lesson and assists the student to complete the desired student responses. A criteria statement in each lesson specifies what steps a student must be able to perform before moving on to the next lesson.

At the end of each teaching session, the teacher scores a simple data sheet included in the program package. The data sheet is designed to show whether the student met the criteria for the lesson in progress and provides the teacher with an overview of the student's progress in the program.

SUBJECT AREAS

In the first two lessons, the student learns to pinch and pull a shoelace. In Lessons 3 through 9, the student learns to tie the laces on a model shoe. In Lesson 10, the student ties the laces on his own shoes, and in Lesson 11, the student ties and unties the laces on his shoes.

The lessons are written in sequence and should be taught in the order presented; however, not all students need begin at Lesson 1. A criterion statement at the end of every lesson indicates what steps a student must be able to perform before moving on to the next lesson.

INTENDED USERS AND BENEFICIARIES

The Shoe Tie Program is designed to be used by teachers or paraprofessionals in the classroom. The program is intended to be used with students, regardless of chronological age, who possess the required entry skills. The lessons are finely sequenced to make the program most useful for teachers of students with moderate to severe handicaps.

GOALS OR PURPOSES

The goal of the Shoe Tie Program is to teach students to tie and untie the shoelaces on their own shoes in a minimum amount of time, with a minimum amount of student and teacher error.

PATTERNS OF USE

Although all students will not begin at Lesson 1, the lessons are written in sequence and should be taught in the order presented. A student does not progress to the next lesson in the sequence until he has met the criteria for the lesson in progress.

ASSESSMENT PROVISIONS

Before entering a student in the Shoe Tie Program, the teacher administers a pretest to determine whether the student has the necessary entry behaviors. The pretest also indicates whether the student already has the skills taught by the program. Ten copies of the pretest data sheet are included in the manual.

Ten copies of the data sheet for the lessons are also included. One data sheet is used for each student in the program to provide an overview of the student's progress. At the end of each teaching session, the teacher simply indicates whether the student met the specific criteria for that lesson.

TIME REQUIREMENTS

One lesson is administered each school day and may require up to ten minutes per student. A student will stay on one lesson for as many days as necessary for him to meet the criteria for that lesson. The length of time needed to complete the program will vary depending on the lesson at which the student begins the program. Data from 25 students indicates an average of 19 instructional days to complete the program.

IMPLEMENTATION PROCEDURES

All directions and materials required for implementing this program are included in the program package with the exception of a shoe with tie laces and a simple wooden device (Remedo Board) used to teach pinching and pulling shoelaces. Directions for constructing this device are included; using scrap lumber, the cost of construction is less than one dollar.

MATERIALS, EQUIPMENT AND PERSONNEL REQUIREMENTS

<u>Required items</u>	<u>Quantity needed</u>	<u>Cost per item</u>	<u>Replacement rate</u>
Teacher's manual	1 per teacher	Undetermined	Reusable
Remedo Board	1 per classroom	Undetermined	Reusable
Model shoe	1 per classroom	Undetermined	Reusable

Personnel Required for Product Adoption and Implementation

Since one-to-one administration is an expensive educational procedure, the program is designed to be administered by trained as well as untrained personnel.

ASSURANCES AND CLAIMS

The Shoe Tie Program has undergone one of two phases of fieldtesting in the public schools. After 45 instructional days, 12 teachers returned data on 25 students with moderate to severe handicaps. Of these 25 students, 15 learned to tie shoes. The remaining 10 students had various physical and/or behavioral problems which precluded their completion of the program.

Feedback from fieldtest administrators indicates that when used as directed in the manual, the Shoe Tie Program does not affect users negatively, does not perpetuate social biases, and is transportable. It should be noted that the teacher's manual uses the generic "he." Data from a final fieldtest phase with a larger population of teachers and students will provide additional information as to the validity of these assurances. The program will be revised to eliminate such shortcomings.

AVAILABILITY

Present Status

The program exists in an experimental edition only. A limited number of copies are available at this time for teachers outside the EEU who volunteer to test the program with their students and to provide feedback on their experience using the program. The program will be revised as necessary based on data and feedback from these teachers.

Distributor

Further information is available upon request to:

Experimental Education Unit, WJ-10
Child Development and Mental Retardation Center
University of Washington
Seattle, Washington 98195

INFORMATION CURRENT AS OF APRIL 1975.

4. Practitioner Products: To determine if this section is appropriate for your project, consult the definitions on pp. 1-2 of the Guidelines for NIE Product Catalog Entries. Products included would be: curriculum materials, administrator/teacher training materials, replicable models, test and measurement instruments, catalogs, guidelines, etc. If the project has multiple products please supply the information, on separate sheets, for each product. Also, if the status of product components differs, complete a separate set of pages for each component as well as each product.

A. Product Name: THE RULER MEASUREMENT PROGRAM

Component name (if status of product components differs):

B. Type of Product (Check all that apply)

- ☒ Curriculum materials for students
☐ Administrator/teacher training or development materials
☐ Tests or measurement instruments
☐ Replicable models
☐ Other, please specify (catalogs, guidelines, handbooks, resource guides, etc.)

C. Product's Developmental Status (Check all that will apply by November 30, 1975)

- ☒ Early development complete (design, prototypes or first drafts, pilot tests)
☒ Field (operationally ready) forms of the product complete (original or revised product forms that are sufficiently complete to allow them to be used in a field setting where the developer's presence is not continually required to make them work)
☐ Revised forms are complete, making the product suitable for release through a publisher or on any basis
☒ Necessary implementation aids completed (teacher guides, step-by-step implementation suggestions, trouble shooting suggestions, orientation materials, etc.)
☐ Postpublication revisions completed (errors have been corrected or product has been updated or improved after initial publication)
☐ User adaptations have been documented (special user groups have transformed the product to meet their unique needs or constraints)
☐ Other, please specify

D. Developmental Costs of the Product to Date

Please give approximate estimates of costs ($\pm 15\%$ range acceptable), including such activities as planning, evaluation, dissemination to trial sites, overhead costs, etc.

	<u>Research and Development Costs</u>	<u>Dissemination and Utilization Costs</u>
OE Funds	\$ 4,038.00	\$ 712.00
NIE Funds	\$ 8,075.00	1,425.00
Other <u>1/</u> Funds	\$ 2,200.00	
TOTAL	\$ 14,313.00	\$2,137.00

E. Product's Evaluation Status (Check all that will apply by November 30, 1975)

- ☒ Marketing or feasibility studies completed
- ☒ Small-scale field tests of practicability, transportability, or replicability completed (e.g., studies that might answer the question: Can a teacher use this product without major intervention by the developer?)
- ☒ Small-scale, controlled tests of effectiveness (e.g., tests that would answer questions related to product effects by controlling for the effects of other variables or circumstances that might have produced the same results or by performing followup studies of these pilot or field test product users)
- ☐ Large-scale replications in a number of sites to confirm the practicability, transportability, and replicability of the product, as well as to generally confirm the findings for a range of target users and verify previous findings
- ☐ Followup studies of the impact of the product's implementation or of product improvement several months or years after the product had been released and was no longer under the developer's control
- ☐ Other, please specify

1/ If you have any way of estimating it, please indicate the "leverage" effect your project has had in generating other funds, for example, expenditures for schools to buy or install the product, contributions by foundations to development or dissemination. If the situation is complex, a summary breakdown would be helpful.

F. Distribution Status (Check all that will apply by November 30, 1975)

- ☒ Interim version released and is available either on an inhouse basis (e.g., with a revolving fund) or through a temporary printing arrangement
- ☐ A search is underway for an external publisher
- ☐ A final version is available on an inhouse basis
- ☐ A search for an external publisher has been concluded; a publisher has been identified but a contract has not been signed
- ☐ A search for an external publisher has been concluded and satisfactory publishing arrangements have been made
- ☐ A search for an external publisher has been concluded, but a publisher was not secured and it seems unlikely that satisfactory external arrangements will be made
- ☐ The product is on the market and available for sale
- ☐ The product is available on a loan or rental basis (from publisher, National Audio Visual Center, etc.)
- ☐ The product is available from ERIC (microfiche or hard copy)
- ☐ Other, please specify

G. Dissemination Status (Check all that will apply by November 30, 1975)

- ☒ Informational and/or promotional materials available (brochures, catalogs, sample materials, etc.)
- ☐ Informational and/or promotional materials have been distributed on a national basis--reaching at least 25 percent of the potential market
- ☐ Informational or promotional briefings have been held across the country (for example, 10 or more briefings to potential audiences: at conventions, specially arranged introductions, or to personnel in State education agencies)
- ☐ Several major field demonstrations have been held (for example, the product has been installed in several schools around the country and arrangements have been made in the area of the demonstration for visitors to be brought to the site, shown the product in use, and talk with users)

- ☐ Large-scale field testing has occurred that served as an initial marketing device for the product among early adopters
- ☐ Product available on trial basis at no or minimum cost to user
- ☐ Other, please specify

II. Implementation Assistance Status (Check all that will apply by November 30, 1975)

- ☐ A cadre of trained consultants, trainers, or other appropriate personnel is available to assist people in the use of the product
- ☐ Training or other technical assistance mechanisms available have been used by over 10 percent of the current users of the product
- ☒ If you believe that training or technical assistance is unnecessary for the use of the product, please check this line
- ☐ Other, please specify

I. Product Sales

- . Total dollar sales to March 1975 (estimate) \$ _____ No. of years ()
- . Estimated total number of product units sold to March 1975. Define a unit as the largest selling product item, i.e., student materials rather than teacher's manual. _____ No. of years ()
- . Estimated total individual users from target population (teachers if teacher training product; students if product is primarily designed for student use, etc.) to March 1975. Specify target population reference group. _____ No. of years ()
- . Estimated universe of possible individual target population users in the United States for 1976 _____ No. of years ()
- . At a later time would it be possible to break these figures down into annual sales and users? _____ Yes _____ No

J. User Sites

On the attached page, please check the States where the product has been used in more than one local district. If you have an existing directory of purchasers or users, computer lists, lists of product use by Congressional district, or other formal devices for tracking users, we would like to know of them and receive a copy of the directory or sample pages from the computer list. We don't require complete lists but rather a sense of the extent of the information.

(Please check one)

- ☐ Published user list available
- ☒ Unpublished, inhouse user list available
- ☐ No user list available, but could be developed
- ☐ User list would be impossible to develop

K. Product Impact

On a separate page, please give unique anecdotal evidence of the product's impact. (Keep it short, but this is particularly important information which we need for Congressional testimony.) Also identify the location of incident and the Congressional district in which it occurred.

PRODUCT IMPACT

Fourteen teachers working with 31 students are currently fieldtesting the Ruler Measurement Program in the public schools. Although the majority of data have not yet been received, the early evidence indicates that substantial revisions will be required to increase the ruler program's effectiveness.

PRODUCT USER SITES

Please check the States (or the District of Columbia, Puerto Rico, and Virgin Islands) where the product has been used in more than one local district. Also, if possible note the fact that product was used in a large urban district (New York City, Chicago, Los Angeles, etc.) within that State.

☐ ALABAMA
☐ ALASKA
☐ ARIZONA
☐ ARKANSAS
☐ CALIFORNIA
☐ COLORADO
☐ CONNECTICUT
☐ DELAWARE
☐ FLORIDA
☐ GEORGIA
☐ HAWAII
☐ IDAHO
☐ ILLINOIS
☐ INDIANA
☐ IOWA
☐ KANSAS
☐ KENTUCKY
☐ LOUISIANA
☐ MAINE
☐ MARYLAND
☐ MASSACHUSETTS
☐ MICHIGAN
☐ MINNESOTA
☐ MISSISSIPPI
☐ MISSOURI
☐ MONTANA
☐ NEBRASKA

☐ NEVADA
☐ NEW HAMPSHIRE
☐ NEW JERSEY
☐ NEW MEXICO
☐ NEW YORK
☐ NORTH CAROLINA
☐ NORTH DAKOTA
☐ OHIO
☐ OKLAHOMA
☐ OREGON
☐ PENNSYLVANIA
☐ RHODE ISLAND
☐ SOUTH CAROLINA
☐ SOUTH DAKOTA
☐ TENNESSEE
☐ TEXAS
☐ UTAH
☐ VERMONT
☐ VIRGINIA
☒ WASHINGTON
☐ WEST VIRGINIA
☐ WISCONSIN
☐ WYOMING
☐ PUERTO RICO
☐ DISTRICT OF COLUMBIA
☐ VIRGIN ISLANDS
☐ OTHER, PLEASE SPECIFY

NIE PRODUCT: THE RULER MEASUREMENT PROGRAM

DEVELOPER/AUTHOR: Experimental Education Unit, WJ-10
Child Development and Mental Retardation Center
University of Washington
Seattle, Washington 98195

Norris G. Haring, Project Director

NARRATIVE DESCRIPTION

The Ruler Measurement Program is a self-contained instructional program to be used by teachers and students. The program teaches measuring with a 12-inch ruler. The program is intended to be used with any student who lacks ruler measurement skills, but who possesses the following entry skills: grasp motion; turn motion; count and identify numbers from 1 to 12; precise use of a pencil; identify a ruler; concept of top and bottom; concept of fractions ($1/8$, $1/4$, $1/2$); write fractions; divide 2, 4, 8, 10, 12 by 2; divide 4, 8, 12 by 4. These prerequisite skills are assessed by the pretest included in the teacher's manual. Students are differentially placed in the program based on their pretest data; not all students begin at Lesson 1.

The teacher's manual is self-explanatory and may be used by teachers, paraprofessionals, or volunteers in the classroom. The lessons are administered on a one-to-one basis and require approximately 15 minutes per student per day. The lessons are presented in a three column format: the teacher's column includes detailed directions and the actual words the teacher says to the student; the student column lists the correct responses expected of the student; the third column, Remediation, indicates recommended procedures to follow if the student does not respond correctly.

In addition to the teacher's manual, the program includes numerous instructional aids, individual student workbooks, and sets of data cards. The teacher demonstrates the procedures specified in the lesson and assists the student to complete the desired student responses. The student completes work sheets as part of the daily lesson, and the teacher scores correct and error responses on the student's set of data cards. At the end of each lesson, the teacher figures percent correct scores for the lesson and work sheets. A student does not move on to the next lesson in the sequence until he meets the criterion of 90% correct responses on the lesson in progress.

SUBJECT AREAS

The first three sections of the Ruler Measurement Program teach the student to measure line segments to the nearest $1/2$, $1/4$, and $1/8$ inch, using a 12-inch ruler. The next three sections teach the student to rule lines on a blank sheet of paper in the same place as the lines already drawn on a model. The final two sections teach the student to divide line segments into halves and fourths. A student never enters one of these sections until he masters the skills taught in the preceding sections.

INTENDED USERS AND BENEFICIARIES

The Ruler Measurement Program is designed to be used by teachers or paraprofessionals in the classroom. It is intended for students, regardless of chronological age, who possess the required entry skills. In order to insure the effectiveness of the program when used with students who have general or specific learning disabilities, the lessons allow for substantial overlearning and frequent review.

GOALS OR PURPOSES

The terminal goal of the Ruler Measurement Program is to teach the correct use of a 12-inch ruler. The threefold goal is to teach the student to use the ruler in three ways: 1) measure line segments; 2) rule paper; and 3) divide line segments into equal parts. The purpose is to enable the student to reach these goals in a minimum amount of time, with a minimum amount of student and teacher error.

PATTERNS OF USE

Students for the program are selected on the basis of a pretest which serves two functions. First, the pretest assesses the student's basal skill level. Second, it indicates where the student should be placed in the program, if the need for advanced placement is indicated by the pretest data. The pretest requires 15 minutes to administer and is fully explained in the teacher's manual.

In addition to the pretest and 36 lessons included in the teacher's manual, the ruler program includes a student workbook and numerous aids. These materials represent a carefully developed and tested set of color and number cues which are gradually faded as the student progresses through the lessons.

ASSESSMENT PROVISIONS

A set of data cards is provided for every student in the Ruler Measurement Program. One card corresponds to each lesson or set of work sheets. The correct student responses indicated in the lessons are coded with sequential numbers. These response numbers appear on the data cards for the appropriate lesson. The teacher indicates on the card whether the student responded correctly on the first, second, or third trial. At the end of the lesson, the teacher totals the number of correct and error responses and figures a percent correct score for the lesson and another percent correct score for the work sheets. A student must score 90% correct in order to proceed to the next lesson.

The purpose of the individual sets of data cards is to provide the program developer with data across students on every response indicated in the lessons. If a high percentage of student data indicate difficulty on any one response, that portion of the lesson would be revised to eliminate errors.

TIME REQUIREMENTS

One lesson is administered each school day and may require up to 15 minutes to administer. A student will stay on one lesson for as many days as necessary to meet the criteria for that lesson. The length of time required for a student to complete all 36 lessons will vary depending on the lesson at which the student begins the program. Allowing for absences and repeated lessons, a teacher should allow a minimum of 60 days to complete the program.

IMPLEMENTATION PROCEDURES

All directions and materials required for implementing this program are included in the program package.

MATERIALS, EQUIPMENT AND PERSONNEL REQUIREMENTS

Required items	Quantity needed	Cost per item	Replacement rate
Teacher's manual	1 per teacher	Undetermined	Reusable
Instructional aids	1 set per room	Undetermined	Reusable
Student workbooks	1 per student	Undetermined	Consumable
Sets of data cards	1 per student	Undetermined	Consumable

Personnel Required for Product Adoption and Implementation

Since one-to-one administration is an expensive educational procedure, the program is designed to be used by trained as well as untrained personnel.

ASSURANCES AND CLAIMS

The Ruler Measurement Program has been fieldtested by a limited number of teachers and students in the public schools. As of this time, there have been no indications that the program affects users negatively or perpetuates social biases. The program has thus far proved to be transportable. Further field-testing is needed to provide additional data on the validity of these assurances. The program will be revised to eliminate such shortcomings. It should be noted that the teacher's manual uses the generic "he."

AVAILABILITY

Present Status

The program exists in an experimental edition only. A limited number of copies are available at this time for teachers outside the EEU who volunteer to test the program with their students and to provide feedback on their experience using the program. The program will be revised as necessary based on data and feedback from these teachers.

Distributor

Further information is available upon request to:

Experimental Education Unit, WJ-10
Child Development and Mental Retardation Center
University of Washington
Seattle, Washington 98195

INFORMATION CURRENT AS OF APRIL 1975.

4. Practitioner Products: To determine if this section is appropriate for your project, consult the definitions on pp. 1-2 of the Guidelines for NIE Product Catalog Entries. Products included would be: curriculum materials, administrator/teacher training materials, replicable models, test and measurement instruments, catalogs, guidelines, etc. If the project has multiple products please supply the information, on separate sheets, for each product. Also, if the status of product components differs, complete a separate set of pages for each component as well as each product.

A. Product Name: THE CLOTHES FASTENING PROGRAM

Component name (if status of product components differs):

B. Type of Product (Check all that apply)

- ☒ Curriculum materials for students
☐ Administrator/teacher training or development materials
☐ Tests or measurement instruments
☐ Replicable models
☐ Other, please specify (catalogs, guidelines, handbooks, resource guides, etc.)

C. Product's Developmental Status (Check all that will apply by November 30, 1975)

- ☒ Early development complete (design, prototypes or first drafts, pilot tests)
☒ Field (operationally ready) forms of the product complete (original or revised product forms that are sufficiently complete to allow them to be used in a field setting where the developer's presence is not continually required to make them work)
☐ Revised forms are complete, making the product suitable for release through a publisher or on any basis
☒ Necessary implementation aids completed (teacher guides, step-by-step implementation suggestions, trouble shooting suggestions, orientation materials, etc.)
☐ Postpublication revisions completed (errors have been corrected or product has been updated or improved after initial publication)
☒ User adaptations have been documented (special user groups have transformed the product to meet their unique needs or constraints)
☐ Other, please specify

D. Developmental Costs of the Product to Date

Please give approximate estimates of costs ($\pm 15\%$ range acceptable), including such activities as planning, evaluation, dissemination to trial sites, overhead costs, etc.

	<u>Research and Development Costs</u>	<u>Dissemination and Utilization Costs</u>
OE Funds	\$ 4,038.00	\$ 712.00
NIE Funds	\$ 8,075.00	1,425.00
Other ^{1/} Funds	\$ 2,200.00	
TOTAL	\$ 14,313.00	\$2,137.00

E. Product's Evaluation Status (Check all that will apply by November 30, 1975)

- ☐ Marketing or feasibility studies completed
- ☒ Small-scale field tests of practicability, transportability, or replicability completed (e.g., studies that might answer the question: Can a teacher use this product without major intervention by the developer?)
- ☒ Small-scale, controlled tests of effectiveness (e.g., tests that would answer questions related to product effects by controlling for the effects of other variables or circumstances that might have produced the same results or by performing followup studies of these pilot or field test product users)
- ☒ Large-scale replications in a number of sites to confirm the practicability, transportability, and replicability of the product, as well as to generally confirm the findings for a range of target users and verify previous findings
- ☐ Followup studies of the impact of the product's implementation or of product improvement several months or years after the product had been released and was no longer under the developer's control
- ☐ Other, please specify

^{1/} If you have any way of estimating it, please indicate the "leverage" effect your project has had in generating other funds, for example, expenditures for schools to buy or install the product, contributions by foundations to development or dissemination. If the situation is complex, a summary breakdown would be helpful.

F. Distribution Status (Check all that will apply by November 30, 1975)

- ☒ Interim version released and is available either on an inhouse basis (e.g., with a revolving fund) or through a temporary printing arrangement
- ☐ A search is underway for an external publisher
- ☐ A final version is available on an inhouse basis
- ☐ A search for an external publisher has been concluded; a publisher has been identified but a contract has not been signed
- ☐ A search for an external publisher has been concluded and satisfactory publishing arrangements have been made
- ☐ A search for an external publisher has been concluded, but a publisher was not secured and it seems unlikely that satisfactory external arrangements will be made
- ☐ The product is on the market and available for sale
- ☐ The product is available on a loan or rental basis (from publisher, National Audio Visual Center, etc.)
- ☐ The product is available from ERIC (microfiche or hard copy)
- ☐ Other, please specify

G. Dissemination Status (Check all that will apply by November 30, 1975)

- ☒ Informational and/or promotional materials available (brochures, catalogs, sample materials, etc.)
- ☐ Informational and/or promotional materials have been distributed on a national basis--reaching at least 25 percent of the potential market
- ☐ Informational or promotional briefings have been held across the country (for example, 10 or more briefings to potential audiences: at conventions, specially arranged introductions, or to personnel in State education agencies)
- ☐ Several major field demonstrations have been held (for example, the product has been installed in several schools around the country and arrangements have been made in the area of the demonstration for visitors to be brought to the site, shown the product in use, and talk with users)

- _____ Large-scale field testing has occurred that served as an initial marketing device for the product among early adopters
- _____ Product available on trial basis at no or minimum cost to user
- _____ Other, please specify

II. Implementation Assistance Status (Check all that will apply by November 30, 1975)

- _____ A cadre of trained consultants, trainers, or other appropriate personnel is available to assist people in the use of the product
- _____ Training or other technical assistance mechanisms available have been used by over 10 percent of the current users of the product
- ☒ If you believe that training or technical assistance is unnecessary for the use of the product, please check this line
- _____ Other, please specify

I. Product Sales

- . Total dollar sales to March 1975 (estimate) \$ _____ No. of years ()
- . Estimated total number of product units sold to March 1975. Define a unit as the largest selling product item, i.e., student materials rather than teacher's manual. _____ No. of years ()
- . Estimated total individual users from target population (teachers if teacher training product; students if product is primarily designed for student use, etc.) to March 1975. Specify target population reference group. _____ No. of years ()
- . Estimated universe of possible individual target population users in the United States for 1976 _____ No. of years ()
- . At a later time would it be possible to break these figures down into annual sales and users? _____ Yes _____ No

J. User Sites

On the attached page, please check the States where the product has been used in more than one local district. If you have an existing directory of purchasers or users, computer lists, lists of product use by Congressional district, or other formal devices for tracking users, we would like to know of them and receive a copy of the directory or sample pages from the computer list. We don't require complete lists but rather a sense of the extent of the information.

(Please check one)

- ☐ Published user list available
- ☒ Unpublished, inhouse user list available
- ☐ No user list available, but could be developed
- ☐ User list would be impossible to develop

K. Product Impact

On a separate page, please give unique anecdotal evidence of the product's impact. (Keep it short, but this is particularly important information which we need for Congressional testimony.) Also identify the location of incident and the Congressional district in which it occurred.

PRODUCT IMPACT

The Clothes Fastening Program has been tested and refined over the last two years at the Experimental Education Unit. As the program proved successful with this initial population of students, an experimental edition was recently prepared for dissemination to secondary fieldtest administrators in the public schools. Data from these administrators will provide an indication of the program's effectiveness when used by teachers other than the program developer's colleagues.

-150-
PRODUCT USER SITES

Please check the States (or the District of Columbia, Puerto Rico, and Virgin Islands) where the product has been used in more than one local district. Also, if possible note the fact that product was used in a large urban district (New York City, Chicago, Los Angeles, etc.) within that State.

___ ALABAMA
___ ALASKA
___ ARIZONA
___ ARKANSAS
___ CALIFORNIA
___ COLORADO
___ CONNECTICUT
___ DELAWARE
___ FLORIDA
___ GEORGIA
___ HAWAII
___ IDAHO
___ ILLINOIS
___ INDIANA
___ IOWA
___ KANSAS
___ KENTUCKY
___ LOUISIANA
___ MAINE
___ MARYLAND
___ MASSACHUSETTS
___ MICHIGAN
___ MINNESOTA
___ MISSISSIPPI
___ MISSOURI
___ MONTANA
___ NEBRASKA

___ NEVADA
___ NEW HAMPSHIRE
___ NEW JERSEY
___ NEW MEXICO
___ NEW YORK
___ NORTH CAROLINA
___ NORTH DAKOTA
___ OHIO
___ OKLAHOMA
___ OREGON
___ PENNSYLVANIA
___ RHODE ISLAND
___ SOUTH CAROLINA
___ SOUTH DAKOTA
___ TENNESSEE
___ TEXAS
___ UTAH
___ VERMONT
___ VIRGINIA
___ X WASHINGTON
___ WEST VIRGINIA
___ WISCONSIN
___ WYOMING
___ PUERTO RICO
___ DISTRICT OF COLUMBIA
___ VIRGIN ISLANDS
___ OTHER, PLEASE SPECIFY

NIE PRODUCT: THE BUTTONING PROGRAM
(Part of the Clothes Fastening Program)

DEVELOPER/AUTHOR: Experimental Education Unit, WJ-10
Child Development and Mental Retardation Center
University of Washington
Seattle, Washington 98195

Norris G. Haring, Project Director

NARRATIVE DESCRIPTION

The Buttoning Program is one of three mini-programs included in a self-contained teacher's manual entitled The Clothes Fastening Program. Other programs teach zipping and snapping (listed under separate catalog entries). The Buttoning Program teaches buttoning and unbuttoning large buttons on a child's vest with horizontal buttonholes. Students for the program are selected on the basis of a pretest which assesses both the entry skills and target behaviors. Entry skills include the abilities to pinch, pull, and imitate the actions of others.

The program is self-explanatory and may be used by teachers, paraprofessionals, or volunteers in the classroom. The lessons are administered on a one-to-one basis and require approximately five minutes per student per day. The lessons are presented in a three column format: the teacher's column includes detailed directions and the actual words the teacher says to the student; the student column lists the correct responses expected of the student; the third column, Remediation, indicates recommended procedures to follow if the student does not respond correctly.

In each lesson, the student wears a child-size vest with three buttons which are approximately 1-1/4 inch in diameter. The teacher demonstrates the procedures specified in the lesson and assists the student to complete the desired student responses. In each lesson, the student learns to complete a new step in addition to the steps mastered in previous lessons.

At the end of each teaching session, the teacher scores a simple data sheet included in the program package. The data sheet is designed to show whether or not the student met the criteria for the lesson in progress and provides the teacher with an overview of the student's progress in the program.

SUBJECT AREAS

The first five lessons teach buttoning in a backwards chaining sequence. The sixth lesson teaches unbuttoning. The lessons are written in sequence and should be taught in the order presented. A criterion statement at the end of every lesson indicates what steps a student must be able to perform before moving on to the next lesson.

INTENDED USERS AND BENEFICIARIES

The Buttoning Program is designed to be used by teachers or paraprofessionals in the classroom. The program is intended to be used with students, regardless of chronological age, who possess the required entry skills. The lessons are finely sequenced to make the program most useful for teachers of students with moderate to severe handicaps.

GOALS OR PURPOSES

The goal of the Buttoning Program is to teach students to button and unbutton in a minimum amount of time with a minimum amount of student and teacher error. As the lessons teach the student to master these skills on only large buttons in horizontal buttonholes, recommended generalization procedures are included for continuation on smaller, more difficult buttons.

PATTERNS OF USE

The Buttoning Program is included in the same teacher's manual as programs for zipping and snapping. The teacher may decide to use one or all of the programs and may use them in whatever order most appropriate. However, the lessons within the program are written in sequence and should be taught in the order presented. The student does not progress to the next lesson in the sequence until he has met the criteria for the lesson in progress.

ASSESSMENT PROVISIONS

Students for the program are selected on the basis of a pretest which indicates whether or not the student has the skills necessary to begin the program. The pretest also indicates whether or not the student already has the skills taught by the program and provides an indication of the student's proficiency. Fifteen copies of the pretest data sheet are included in the manual.

Ten copies of the Buttoning Program data sheet are also included. One data sheet is used for each student in the program to provide an overview of the student's progress. At the end of each teaching session, the teacher simply indicates whether or not the student met the specific criteria for that lesson.

TIME REQUIREMENTS

One lesson is administered each school day and may require up to five minutes per student. Individual students will require varying lengths of time to complete the entire program, ranging from two weeks to several months.

IMPLEMENTATION PROCEDURES

All materials required for implementing this program are included in the program package. Directions for using the various materials are also included.

MATERIALS, EQUIPMENT AND PERSONNEL REQUIREMENTS

<u>Required items</u>	<u>Quantity needed</u>	<u>Cost per item</u>	<u>Replacement rate</u>
Teacher's manual	1 per teacher	Undetermined	Reusable
Button vests (male and female)	1 each per room	Undetermined	Reusable

Personnel Required for Product Adoption and Implementation

Since one-to-one administration is an expensive educational procedure, the program is designed to be administered by trained as well as untrained personnel.

ASSURANCES AND CLAIMS

The Buttoning Program has been tested with a limited population of teachers and students at the Experimental Education Unit (EEU). As of this time, there have been no indications that the program affects users negatively or perpetuates social biases. The program has been designed to be transportable. Both boys' and girls' button vests are included in the program package as buttons on their respective clothing normally are sewn on opposite sides. However, the teacher directions in the lessons do not relate specifically to either girls' or boys' clothing. It should be noted that the teacher's manual uses the generic "he."

Further fieldtesting will be conducted with a larger population of teachers and students in the public schools in the spring, 1975. Data from this fieldtesting will provide additional information as to the validity of these assurances. The program will be revised to eliminate such shortcomings.

AVAILABILITY

Present Status

The program exists in an experimental edition only. A limited number of copies are available at this time for teachers outside the EEU who volunteer to test the program with their students and to provide feedback on their experience using the program. The program will be revised as necessary based on data and feedback from these teachers.

Distributor

Further information is available upon request to:

Experimental Education Unit, WJ-10
Child Development and Mental Retardation Center
University of Washington
Seattle, Washington 98195

INFORMATION CURRENT AS OF APRIL 1975.

NIE PRODUCT: THE ZIPPING PROGRAM -154-
(Part of the Clothes Fastening Program)

DEVELOPER/AUTHOR: Experimental Education Unit, WJ-10
Child Development and Mental Retardation Center
University of Washington
Seattle, Washington 98195

NARRATIVE DESCRIPTION

The Zipping Program is one of three mini-programs included in a self-contained teacher's manual entitled The Clothes Fastening Program. Other programs teach buttoning and snapping (listed under separate catalog entries). The Zipping Program teaches zipping and unzipping on a child's vest with a large zipper. Students for the program are selected on the basis of a pretest which assesses both the entry skills and target behaviors. Entry skills include the abilities to pinch, pull, and imitate the actions of others.

The program is self-explanatory and may be used by teachers, paraprofessionals, or volunteers in the classroom. The lessons are administered on a one-to-one basis and require approximately five minutes per student per day. The lessons are presented in a three column format: the teacher's column includes detailed directions and the actual words the teacher says to the student; the student column lists the correct responses expected of the student; the third column, Remediation, indicates recommended procedures to follow if the student does not respond correctly.

In each lesson, the student wears a child-size zipper vest. The teacher demonstrates the procedures specified in the lesson and assists the student to complete the desired student responses. In each lesson, the student learns to complete a new step in addition to the steps mastered in previous lessons.

At the end of each teaching session, the teacher scores a simple data sheet included in the program package. The data sheet is designed to show whether the student met the criteria for the lesson in progress and provides the teacher with an overview of the student's progress in the program.

SUBJECT AREAS

The first six lessons teach engaging, zipping, and locking a zipper in a backward chaining sequence. Lesson 7 teaches unzipping. The lessons are written in sequence and should be taught in the order presented. A criterion statement at the end of every lesson indicates what steps a student must be able to perform before moving on to the next lesson.

INTENDED USERS AND BENEFICIARIES

The Zipping Program is designed to be used by teachers or paraprofessionals in the classroom. The program is intended to be used with students, regardless of chronological age, who possess the required entry skills. The lessons are carefully sequenced to make the program most useful for teachers of students with moderate to severe handicaps.

ASSURANCES AND CLAIMS

The Zipping Program has been tested with a limited population of teachers and students at the Experimental Education Unit (EEU). As of this time, there have been no indications that the program affects users negatively or perpetuates social biases. The program has been designed to be transportable. Further fieldtesting will be conducted with a larger population of teachers and students in the public schools in the spring, 1975. Data from this fieldtesting will provide additional information as to the validity of these assurances. The program will be revised to eliminate such shortcomings.

AVAILABILITY

Present Status

The program exists in an experimental edition only. A limited number of copies are available at this time for teachers outside the EEU who volunteer to test the program with their students and to provide feedback on their experience using the program. The program will be revised as necessary based on data and feedback from these teachers.

Distributor

Further information is available upon request to:

Experimental Education Unit, WJ-10
Child Development and Mental Retardation Center
University of Washington
Seattle, Washington 98195

INFORMATION CURRENT AS OF APRIL 1975.

NIE PRODUCT: THE SNAPPING PROGRAM
(Part of The Clothes Fastening Program)

DEVELOPER/AUTHOR: Experimental Education Unit, WJ-10
Child Development and Mental Retardation Center
University of Washington
Seattle, Washington 98195

Norris G. Haring, Project Director

NARRATIVE DESCRIPTION

The Snapping Program is one of three mini-programs included in a self-contained teacher's manual entitled The Clothes Fastening Program. Other programs teach buttoning and zipping (listed under separate catalog entries). The Snapping Program teaches snapping and unsnapping on a child's vest with three large snaps. Students for the program are selected on the basis of a pretest which assesses both the entry skills and target behaviors. Entry skills include the abilities to pinch, pull, and imitate the actions of others.

The program is self-explanatory and may be used by teachers, paraprofessionals, or volunteers in the classroom. The lessons are administered on a one-to-one basis and require approximately five minutes per student per day. The lessons are presented in a three column format: the teacher's column includes detailed directions and the actual words the teacher says to the student; the student column lists the correct responses expected of the student; the third column, Remediation, indicates recommended procedures to follow if the student does not respond correctly.

In each lesson, the student wears a child-size vest with three large snaps. The teacher demonstrates the procedures specified in the lesson and assists the student to complete the desired student responses. In each lesson, the student learns to complete a new step in addition to the steps mastered in previous lessons.

At the end of each teaching session, the teacher scores a simple data sheet included in the program package. The data sheet is designed to show whether the student met the criteria for the lesson in progress and provides the teacher with an overview of the student's progress in the program.

SUBJECT AREAS

The first four lessons teach snapping in a series of small steps. The fifth lesson teaches unsnapping. The lessons are written in sequence and should be taught in the order presented. A criterion statement at the end of every lesson indicates what steps a student must be able to perform before moving on to the next lesson.

INTENDED USERS AND BENEFICIARIES

The Snapping Program is designed to be used by teachers or paraprofessionals in the classroom. The program is intended to be used with students, regardless of chronological age, who possess the required entry skills. The lessons are finely sequenced to make the program most useful for teachers of students with moderate to severe handicaps.

GOALS OR PURPOSES

The goal of the Snapping Program is to teach students to snap and unsnap in a minimum amount of time with a minimum amount of student and teacher error.

PATTERNS OF USE

The Snapping Program is included in the same teacher's manual as programs for zipping and buttoning. The teacher may decide to use one or all of the programs and may use them in whatever order most appropriate. However, the lessons within the program are written in sequence and should be taught in the order presented. The student does not progress to the next lesson in the sequence until he has met the criteria for the lesson in progress.

ASSESSMENT PROVISIONS

Students for the program are selected on the basis of a pretest which indicates whether the student has the skills necessary to begin the program. The pretest also indicates whether the student already has the skills taught by the program and provides an indication of the student's proficiency. Fifteen copies of the pretest data sheet are included in the manual.

Ten copies of the Snapping Program data sheet are also included. One data sheet is used for each student in the program to provide an overview of the student's progress. At the end of each teaching session, the teacher simply indicates whether the student met the specific criteria for that lesson.

TIME REQUIREMENTS

One lesson is administered each school day and may require up to five minutes per student. Individual students will require varying lengths of time to complete the entire program, ranging from two weeks to several months.

IMPLEMENTATION PROCEDURES

All materials required for implementing this program are included in the program package. Directions for using the various materials are also included.

MATERIALS, EQUIPMENT AND PERSONNEL REQUIREMENTS

Required items	Quantity needed	Cost per item	Replacement rate
Teacher's manual	1 per teacher	Undetermined	Reusable
Snap vest	1 each per room	Undetermined	Reusable

Personnel Required for Product Adoption and Implementation

Since one-to-one administration is an expensive educational procedure, the program is designed to be administered by trained as well as untrained personnel.

ASSURANCES AND CLAIMS

The Snapping Program has been tested with a limited population of students and teachers at the Experimental Education Unit (EEU). As of this time, there have been no indications that the program affects users negatively or perpetuates social biases. The program has been designed to be transportable. Further fieldtesting will be conducted with a larger population of teachers and students in the public schools in the spring, 1975. Data from this fieldtesting will provide additional information as to the validity of these assurances. The program will be revised to eliminate shortcomings.

AVAILABILITY

Present Status

The program exists in an experimental edition only. A limited number of copies are available at this time for teachers outside the EEU who volunteer to test the program with their students and to provide feedback on their experience using the program. The program will be revised as necessary based on data and feedback from these teachers.

Distributor

Further information is available upon request to:

Experimental Education Unit, WJ-10
Child Development and Mental Retardation Center
University of Washington
Seattle, Washington 98195

INFORMATION CURRENT AS OF APRIL 1975.

GOALS OR PURPOSES

The goal of the Zipping Program is to teach students to zip and unzip in a minimum amount of time with a minimum amount of student and teacher error.

PATTERNS OF USE

The Zipping Program is included in the same teacher's manual as programs for buttoning and snapping. The teacher may decide to use one or all of the programs and may use them in whatever order most appropriate. However, the lessons within the program are written in sequence and should be taught in the order presented. The student does not progress to the next lesson in the sequence until he has met the criteria for the lesson in progress.

ASSESSMENT PROVISIONS

Students for the program are selected on the basis of a pretest which indicates whether the student has the skills necessary to begin the program. The pretest also indicates whether the student already has the skills taught by the program and provides an indication of the student's proficiency. Fifteen copies of the pretest data sheet are included in the manual.

Ten copies of the Zipping Program data sheet are also included. One data sheet is used for each student in the program to provide an overview of the student's progress. At the end of each teaching session, the teacher simply indicates whether the student met the specific criteria for that lesson.

TIME REQUIREMENTS

One lesson is administered each school day and may require up to five minutes per student. Individual students will require varying lengths of time to complete the entire program, ranging from two weeks to several months.

IMPLEMENTATION PROCEDURES

All materials required for implementing this program are included in the program package. Directions for using the various materials are also included.

MATERIALS, EQUIPMENT AND PERSONNEL REQUIREMENTS

Required items	Quantity needed	Cost per item	Replacement rate
Teacher's manual	1 per teacher	Undetermined	Reusable
Zipper vest	1 per classroom	Undetermined	Reusable

Personnel Required for Product Adoption and Implementation

Since one-to-one administration is an expensive educational procedure, the program is designed to be administered by trained as well as untrained personnel.